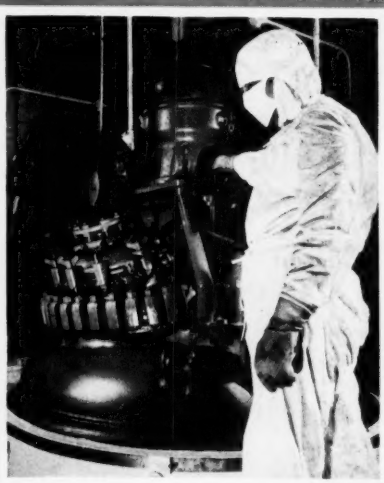
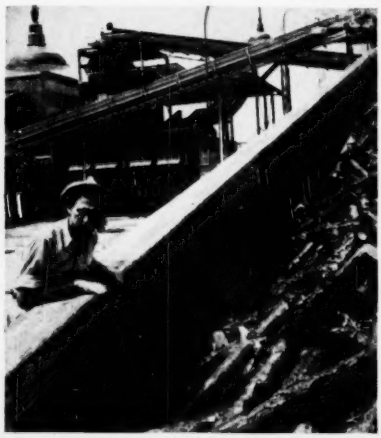
Chemical Week

October 27, 1951 Price 25 cents





Antibiotics production: medical miracles, chemical bonanza; now they're dollar tops ..... p. 9

CW Report: chemical industry outstrips all others in research growth; here's the picture, outlook ... p. 17

Fluorocarbons approach commercial stature; ahead: plenty of unique applications ..... p. 27

It's a world-wide trend: Rayon makers battle softwood shortage with new hardwood processes. p. 31

Something new is added to emulsion wax polishes: much more shellac..... p. 35

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POSITIVE, LOW COST CONTROL OF INDUSTRIAL WASTES...

Effective, positive treatment for phenol, cyanide and other noxious industrial wastes—without excessive installation and operating costs—is now available through the Mathieson Chlorine Dioxide Process. Existing installations, handling both large and small waste volumes, attest to the efficiency and economy of this treating method.

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0466

SERVING INDUSTRY, AGRICULTURE AND PUBLIC HEALTH

Chemical Week

Volume 69 Number 17

October 27, 1951

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★ ★ ★

POLYCO 446 is a stable dispersion of vinyl chloride internally plasticized by copolymerization. On drying, this copolymer emulsion yields clear, glossy, flexible and extensible films. It contains no added plasticizers and is therefore free of the disadvantages of embrittlement and variable film properties due to plasticizer migration or volatilization.

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VINYL FILM — The excellent adhesion of fused films of Polyco 446 to vinyl film suggests these applications: Water based printing inks — Heat-sealable coatings — Adhesive base for adhesion of vinyl film to paper, cloth, etc.

For complete data write for data sheet P-32

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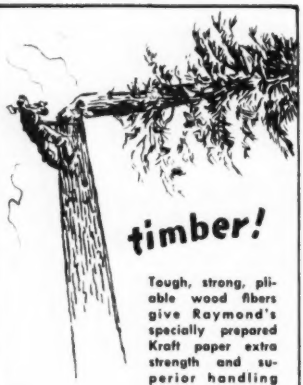

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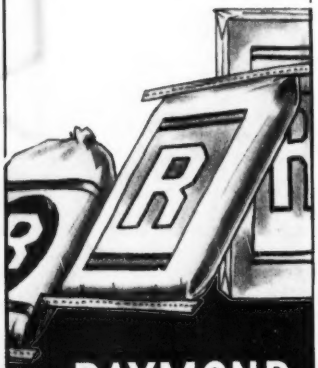
Middletown, Ohio



RAYMOND
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Shipping Sacks

OPINION . . . . .

Callous Phrase

To THE EDITOR: . . . Perhaps because I have long had a great deal of respect for your magazine, I was amazed to see the statement you made in your recent newsletter (Sept. 29) . . .

The exact words are: ". . . We had a chance to improve our thorium supply position by a deal with India for an extraction plant there; and we had a *potent bargaining tool*: wheat; But the wheat was shipped with no strings, we missed a good bet, and now State is too embarrassed to discuss it."

I just can't see that wheat for starving people can be callously regarded as a "bargaining tool" I am sure that you cannot have meant . . . just what you said.

AARON ROTHMAN,
Chicago, Ill.

CW submits that it was guilty of using an indelicate phrasing to report on a delicate—and highly political—subject. We realize, too, that no "bargaining" is really necessary between friends; reciprocity is a fundamental of friendship.—ED.

Glowing Pigments

To THE EDITOR: In your issue of September 29th, in the article "The Glow that Sells" are two mistakes concerning our company, which we wish you would correct.

First: We are manufacturers of phosphorescent and fluorescent pigments and have a considerable production of these products.

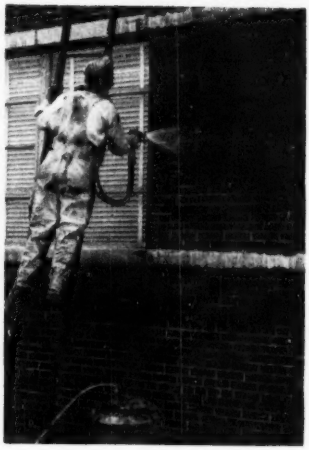
Secondly: West Warwick is located in the state of Rhode Island and not Connecticut. . . .

M. A. WEIL
President
Rhode Island Laboratories, Inc.
West Warwick, R.I.

Right. In discussing the ten companies in the business, we used the word "sell" loosely, did not say clearly that Rhode Island Laboratories is a pigment manufacturer. Too, inexplicably, we bumbled our New England geography, herewith move misplaced West Warwick out of the Nutmeg state.—ED.

Invisible Silicones

To THE EDITOR: Congratulations on the speed with which your masonry water—repellent article ("Like a Duck's Back," Sept. 29) appeared in print. I notice *Life* likes to talk about their editorial speed, but quite evidently they are not alone in that respect.



SILICONE SPRAY: It's invisible.

However, the photograph illustrating the article is completely at variance with your statement that silicone treatments are invisible. The painter shown is obviously applying an opaque, cement-base finish, which may lead your readers into laboring under a mistaken illusion.

Far from being opaque, these silicone-containing formulations are almost water-white while being applied and become absolutely invisible—and remain that way—as soon as the solvent evaporates.

In the enclosed photograph, for instance, the painter's direction of progress across the face of the building cannot be determined.

J. H. O'NEILL
Dow Corning Corp.
Midland, Mich.

On target, Reader O'Neill. CW, guilty of a photo fumble, appreciates your enclosure. See cut.—ED.

Read it "Freon"

To THE EDITOR: On page 13 of the August 25, 1951 issue of your publication CHEMICAL WEEK there appears an article entitled "Expanding—But Still Short", in connection with which is printed a chart in which you have listed a number of products, such as sulfur, nitrogen, chlorine, etc. Included also in this list is the term "Freon" which you have treated just the same as the rest of the terms, which are all descriptive or generic.

"Freon" is a trade-mark of this Company for use on its fluorinated hydrocarbons. It is a valuable mark and we would appreciate it if in the

future when you have occasion to refer to it you will take some steps to distinguish it from descriptive words like sulfur, nitrogen, etc. Our own practice is to place the term in quotation marks and, immediately following the first time it appears on any page of copy, to use the term "fluorinated hydrocarbon" or the specific name of one of the fluorinated hydrocarbons, such as dichlorotetrafluoroethane. When others use the mark, we ask them to indicate in addition to the foregoing that the mark is a Du Pont trade-mark.

We recognize that you may not be as enthusiastic about trying to protect our mark as we are, and while we would like to see you adopt all of the safeguards we ourselves use, we shall be grateful to you if you will use at least some of them.

WILSON C. BAILY
Legal Department
E. I. du Pont de Nemours & Co.
Wilmington, Del.

Corn Cob Cement

TO THE EDITOR: You carried in your issue of Sept. 1 an item which said in effect that the U.S. Department of Agriculture is starting research directed toward making a good lightweight concrete . . . using pelletized corncobs. I have for some years been making good concrete in which all the aggregate is organic vegetable fiber including corncobs. My work . . . has been directed toward making the alkali-soluble portions of the vegetable fiber inert to Portland cement. This includes largely the hemicelluloses which . . . are responsible for spoiling the set of the cement. . . . Neither pure lignin nor pure cellulose interfere seriously.

I use a form of silicate filming not revealed in any patents. . . . It has proven so effective that tensile strengths approaching or exceeding that of mineral aggregate concrete with the same volume of cement are reached. The compressive strengths are lower but on the order of 3 to 10 times the tensile strengths.

In a few experiments with corncobs I reached strengths well in excess of vermiculite with mixes that gave concrete only slightly heavier than with vermiculite. . . .

While . . . excelsior and wider wood ribbons have been bound with inorganic cements . . . and have found use in the building industry . . . their strength depends largely on the matted fiber. They behave badly in the presence of water, swell, shrink,

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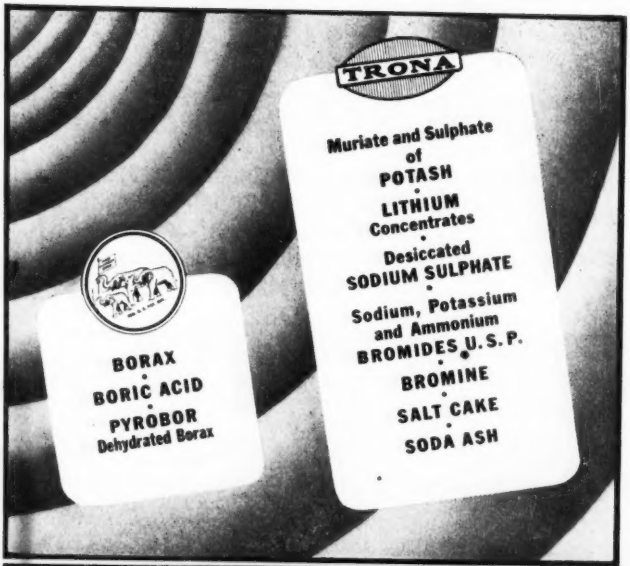

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OPINION . . . . . .

in many cases disintegrate. If the fiber is used as reinforcing . . . and the cement kept in the continuous phase, dimensional changes both from moisture and temperature almost totally disappear.

Three pilot operations, at St. Petersburg, Fla.—using native fibers including bagasse, palmetto and cabbage palm and pine; at Boulder, Colo., using comminuted paper and packing boxes; and Kent, Wash., using forest wastes have proved the utility of fiber concretes. . . .

Corncobs do not have to be pelletized to be put into good concretes . . .

I have carried on research in this field for five years . . . and I have followed up every government-sponsored project of this nature and have yet to find where they have done better with their vast resources of public money. . . .

M. P. Dove
Process and Product Development Engineer
Boulder, Colo.

Phosphate for Fuel

To The Editor: . . . Use of tricresyl phosphate in aviation fuel (Oct. 13) brings me back some 16 years to when I was working as an analytical chemist in one of the larger Eastern petroleum refineries. We were at that time incorporating tricresyl phosphate in one of our products and experienced some rather dire results upon prolonged road testing.

Will history repeat itself?

H. Granholm
Nopco Chemical Co.
Harrison, N. J.

Ability, Not Disability

To The Editor: . . . I read with a great deal of interest your splendid article "Ability, Not Disability" (Oct. 6) . . .

I was, of course, glad to see another "plug" made for the handicapped.

Theodore G. Klumpp,
President,
Winthrop-Stearns, Inc.,
New York, N. Y.

CW welcomes expressions of opinion from readers. The only requirements: that they be pertinent, as brief as possible.

Address all correspondence to: The Editor, Chemical Week, 330 W. 42nd St., New York 18, N. Y.

NEWSLETTER

There's no chance for action during this term of Congress, but when it reconvenes in January, the Senate will find a new, House-approved customs simplification bill awaiting its okay.

The new bill—completely rewritten—is far more acceptable to the chemical industry than the original proposal (CW, August 25). The Manufacturing Chemists Association admits that the major features it found objectionable are omitted from the current version.

The Senate Finance Committee will start hearings in January.

A new product, a new process, a new large-scale use make news:

Abbott Laboratories will manufacture and market the new anticoagulant, Cyclocumarol—3,4-(2'-methyl-2'-methoxy-4'-phenyl) dihydropyranocoumarin—developed by the Wisconsin Alumni Research Foundation (CW, October 20).

Abbott's trade name for the compound is Cumopyrin. WARF holds the patent (U. S. No. 2,427,579), is licensing it to Abbott.

B. F. Goodrich Chemical Co. is looking into the modification of wool with 60%-70% by weight of propiolactone—a development initiated by the U. S. Department of Agriculture's Western Regional Research Laboratory.

The modified fiber has properties akin to those of wool, should be cheaper than wool itself.

Lindane (99.9% gamma isomer of benzene hexachloride—see p. 36) has a new—and maybe its biggest—use to date. The Navy has just approved it in the form of a 1% dust as a louse powder.

DDT was used for this purpose in World War II.

The Government is underwriting expanded acid-grade fluorspar production by Ozark-Mahoning Mining Co., Tulsa.

The company is spending $1.4 million to boost mining and milling capacity by 20,000 tons a year at its Northgate, Colo., mine.

In turn, Defense Materials Procurement Agency will buy whatever concentrates the firm can't sell for $60 per ton.

Another expansion is slated for alumina. Reynolds Metals plans a 1,000 ton-a-day unit adjacent to its reduction plant at Corpus Christi, will proceed as soon as financial arrangements are complete.

Reynolds hasn't received a certificate of necessity for the project, but it has received a letter of intent. Formal issuance of a certificate is almost certain.

Hancock Oil Co. has licensed its glycol process to a Belgian concern, Societe Carbochimique. Construction of a plant will start in December. Some modifications will be necessary, since the Belgium plant will be indoors rather than outdoors.

Estimates of Alberta's natural gas reserves—now placed at close to 14 trillion cubic feet—are a factor leading to quick action on proposals to export gas to the U. S.

Hearings starting this week will get down to cases, clear the roadblocks, determine which companies and which routes will be licensed.

Synthetic fiber progress is making textile men stop and consider: A Du Pont official told New England businessmen not to limit their opportunities by tying themselves down to a single fiber (e.g., many firms use the word "Woolen" in their corporate names).

Adding emphasis to this point of view was Pepperell Mfg. Co.'s disclosure that 70% of the stores receiving initial shipments of dynel blankets—introduced just a month ago—had already reordered.

And Deering, Milliken & Co. brought out an 87½-12½ wool-nylon blend that it describes as "lighter, finer, longer-wearing" than wool.

These isolated developments are "little drops of water" that add up to a swelling tide for chemical textiles.

DPA hasn't officially extended its 60-day moratorium on granting certificates of necessity, but that doesn't mean a return to the pre-moratorium status. It has set up a priority schedule which generally follows the line laid down during the freeze.

Chemicals don't rate high on the preference list: Sulfur is fourth (after machine tools, nonferrous ores and pig iron) and aluminum, nitrogen and aviation gasoline rate sixth, seventh and eighth (after military weapons).

Look for a reorganization soon at NPA. An assistant administrator will return to his private job, and a chemical man will replace him. Promotions will follow right down the line.

NPA's adding machines have come up with first-six-months output figures that show a considerable jump from the first half of 1950.

Random percentage gains: acetanilid, 170%; benzene hexachloride, 118%; light soda ash, 112%; pyridoxine, 100%; 2,4-D, 62%; DDT, 58%; styrene, 38%; phenol and carbon tetrachloride, each 22%.

Declines were registered for natural acetic acid and methanol, motor-grade benzol, hydrochloric acid from chlorine, lead arsenate, refined naphtha and—surprisingly—phosphoric acid from phosphorus.

Aside from these and a few other minor chemicals, all of the 68 chemicals surveyed showed production gains—most of them hefty.

New product, technical developments, and a housing gimmick:

Chlorinated isopropyl N-phenyl carbamate shows considerable promise for control of grass and certain broadleaf weeds. Columbia-Southern Chemical Corp. is beginning limited commercial production. IPC itself had a brief splurge of publicity, but it never attained chemical stature; now the chlorinated compound is moving ahead.

Acid sludge from various Gulf Coast refineries will be turned into concentrated, water-white sulfuric acid in a $3½-million plant which Consolidated Chemical will build at Baton Rouge. Capacity: 400 tons of acid a day. Completion: sometime in 1952.

Brazilian bagasse will be converted to paper pulp. Kinsley Chemical Co. (Cleveland) will license its process, provide technical assistance and chemicals to the Brazilian firm which is building a $2-million, 50-ton-a-day plant. Brazil now imports practically all its pulp needs.

The housing shortage won't furrow the foreheads of Union Carbide's key employees in Ashtabula. The company has just bought 70 acres of desirable residential property, and the houses built thereon will be reserved for Electromet's and Linde's growing number of employees.

. . . The Editors

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U.S.I. CHEMICAL NEWS

October 27 ★ A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1951

Water-Repellent Aerogels Dry Without Shrinking

Production of improved aerogels which have all the properties of dried gels made with present methods, but with the added advantage of water-repellency, is claimed possible with a new process recently patented in Canada.

Aerogels are valuable in removing undesirable compounds from lubricants, refining sugar, purifying gases, absorbing vapors, dehumidifying air, and as carriers for contact catalysts. Up to this time, however, they have suffered from effects of water and humidity, with the result that they shrink on drying out.

High Volume to Weight Ratio

The new aerogels are said to have an extremely high volume to weight ratio, to be highly resistant to moisture, and to overcome successfully the problem of shrinkage on drying. The materials are reported to be useful as fillers for heat insulation and as additives for greases, anticaking agents, printing inks, paints, varnishes, and lacquers. Silica aerogels are incombustible and are said to be suitable substitutes for kapok in life preservers.

Non-Aqueous Titrations Simplify Control Analyses

Non-ionic titration in solvents other than water is described as a promising new analytical tool, the possibilities of which have only been touched upon as yet. Present techniques include a method for titrating an oxazoline in glacial acetic acid with perchloric acid in acetic acid as titrant, replacing a lengthy Kjeldahl procedure formerly used for the determination. Another method can be used to titrate halides, nitrates, sulfates, and phosphates of amines, heterocyclic bases, and quaternary ammonium compounds—including such physiologically active compounds as vitamins, antihistamines, and alkaloids, it is said.

Enthusiastic analysts claim that non-aqueous titrations reduce markedly the cost of running many routine determinations. Less expensive and less complicated equipment is needed, and precision and accuracy are said to be good, all of which are primary requirements of product control laboratories.

Brain Chemical May Cause High Blood Pressure

A recently discovered chemical which is secreted by the brain and passed directly into the blood stream is thought to be a possible factor in causing high blood pressure. The chemical has not been completely identified as yet but is said to resemble serotonin, a substance found in clotted blood. Indications of the chemical's action were obtained when blood pressures of volunteer patients were lowered markedly on administration of hydrazinophthalazene, a drug known to counteract the new compound. The chemical is a possible explanation of why mental stress and anxiety can raise blood pressure, it is said, because mental tension causes an increase in the brain's secretion of the substance.

U.S.I. to Exhibit Products At Three Trade Shows

Will Have Displays at American Vocational Assn. Convention And Georgia State Fair — Complete New Exhibit Booth Being Readied for Paint Industries Show in November

Products of U. S. Industrial Chemicals Co. Division of National Distillers Products Corporation will be exhibited at two conventions and a state fair this fall, company officials announced recently. A U.S.I. exhibit featuring Pyrenone* Grain Protectant — illustrating the grains it protects, the types of storage facilities in which it is effective, and how farmers should apply it — will be on display at the 96th annual Georgia State Fair, to be held this year October 15 through 20 at Macon, Georgia. About 125,000 farmers and members of such groups as Future Farmers of America and 4-H clubs attend the fair each year.

Pyrenone Grain Protectant exhibit to be displayed at American Vocational Association Convention and Georgia State Fair.

Response to the introduction of Pyrenone Grain Protectant has been especially enthusiastic in the South, where insect infestations are severe because of the warm climate. U.S.I. plans to have continuous showings of the new sound movie "Wicked Willie Weevil" at the booth, since it dramatizes the Southern farmers' insect control problem.

Vocational Group Has Large Agricultural Membership

The Pyrenone Grain Protectant exhibit will also be displayed at the American Vocational Association Convention to be held at

MORE

Separate Aromatics Using New Silica Gel Process

A method for commercially separating aromatics by means of silica gel is expected soon to add an annual 13 million gallons of benzene, 30 million gallons of toluene, and 15 million gallons of xylenes to the country's production of these critically needed materials.

Developed from a technique used in petroleum analysis, the process consists of passing an aromatic-rich stream from a catalytic reforming process through a bed of silica gel which retains the aromatics and allows the saturate portion to pass through. When absorption capacity of the gel is reached, the feed is shut off and the bed desorbed, first with a stream of mixed xylenes which washes out residual charge stock, then with a stream of butane which gradually displaces the absorbed aromatics. A light sulfuric acid treatment and final fractionation is reported to produce specification products.

Article Abstracts Apply Statistical Engineering To Chemical Industries

Abstracts of articles on statistical engineering as applied to chemical process industries such as food, refining, pulp and paper, and rubber, are compiled in a single 48-page booklet just published. Statistical engineering is the application of theories of statistical mathematics to experimental processes in order to arrive at most efficient and least costly operation from the standpoint of objectives and results. According to the booklet, statistical methodology has been relatively neglected in chemical experimentation as compared to its use in other fields.

Glycerine-Zirconium Oxide Seen as Poison Ivy Remedy

Poison ivy sufferers will be interested in a new vanishing-cream type of ointment which is reported to have shown highly satisfactory results in medical tests. Containing zirconium oxide and glycerine as principal active ingredients, the ointment is claimed to have cleared up promptly 40 of 47 clinical cases of ivy poisoning treated. In tests on volunteers who were exposed to poison ivy extract, results indicated that the ointment may act as a preventive for poisoning as well as a cure.

Explosion-Proof Glass

A super-laminated plate glass window, developed to minimize effects of explosive forces and to eliminate dangers of flying glass, is reported to have performed successfully in tests involving blasts greater than that of a Hiroshima-type A-bomb at a distance of one mile. Outer layer of the laminate is glass, the middle one is a partially segmented sheet of polyvinyl butyral plastic, the edges of which are bolted to the window frame. The inner layer consists of four triangular pieces of glass held in place by the plastic. When the outer layer is broken by the blast, the plastic layer and inner glass segments swing inward and can later be returned to original position. The plastic's unusual flexibility and resistance to rupture is said to prevent the glass segments from being torn away from the window frame by the impact of the explosion.

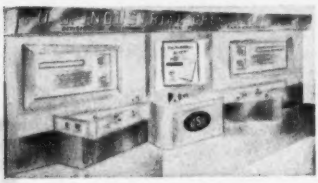
ADVERTISEMENT—*This entire page is a paid advertisement* *Prepared by U. S. Industrial Chemicals Co.*

October 27 ★ **U.S.I. CHEMICAL NEWS** ★ 1951

CONTINUED

Trade Show Exhibits

Minneapolis, Minnesota, November 26 through December 1. At the present time, about half of the A.V.A.'s membership is made up of agricultural personnel, and a high percentage of those who will attend the convention are people who teach and deal with rural youth and adults. This A.V.A. agricultural group,



Artists's conception of the new U.S.I. trade-show exhibit booth that will be unveiled at the Paint Industries' Show. Theme of the new booth is "Keep Posted on New Developments—Keep Your Eye on U.S.I."

who have tremendous influence on today's farmers and future farmers, will have a chance at the convention to get first hand knowledge about U.S.I.'s important new Pyrenone Grain Protectant.

Design New U.S.I. Exhibit for Paint Industries' Show

A completely new U.S.I. trade-show exhibit is under construction now and will be unveiled at the Paint Industries' Show at the Haddon Hall, Atlantic City, New Jersey from October 31 through November 3. Held in conjunction with the annual meeting of the Federation of Paint and Varnish Production Clubs and the National Paint, Varnish and Lacquer Association, this show brings together the members of the protective coatings industry and the raw materials and equipment manufacturers who supply that industry.

Theme of the new U.S.I. booth will be "Keep Posted on New Developments—Keep Your Eye on U.S.I." U.S.I. resins, alcohols, and solvents used in the protective coatings industry will be on display, with samples and literature available.

**Reg. U.S. Pat. Off.*

New Washer Eliminates Bottle-Washing Bottleneck

"Dishwashing" problems, a perennial headache for laboratory management, are reportedly solved with a new automatic glassware washer recently introduced to the market. Designed with problems of both service and industrial laboratories in mind, the washer is said to handle six large baskets of laboratory ware at once—bottles, funnels, tubes, flasks, pipettes, Petri dishes, and microscope slides—and to deliver them thoroughly washed and rinsed, chemically clean in a fraction of the time required by conventional methods.

Baskets and holders are available separately for various types of ware. In operation, the proper baskets are loaded and fitted on a drum which rotates ferris-wheel fashion at 9 r.p.m. in and out of a cleaning solution. By means of jets located at one end of the tank, glassware can be given hot and cold rinses as desired, and, in the steam-heated model, can be treated with live steam as well. In action, the washer is said to require only a few minutes of the operator's time, thus releasing him for other duties.

Radioactive Phosphorus Measures Tire Wear

Radioactive phosphorus is reported to be the tool with which scientists are able, for the first time, to measure accurately the wear of rubber tire treads. The isotope, obtained from Oak Ridge, is incorporated in the compounds forming the top layer of tread material of special test tires. A portable Geiger counter, mounted on a small cart behind the wheel, scans the track made by the radioactive tire as it proceeds on the road surface. X-ray photographs of the track allow precise measurement of the size and amount of rubber particles worn off, and a scoop and filter arrangement back of the tire collect for measurement the particles that are blown into the air.

This method is said to have the advantages of giving instantaneous data and of enabling the evaluation of such factors as the type of road surface and temperature, speed, tire pressure, and transmission of power on tread wear.

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

Rapid surface tension measurements, accurate within 5 per cent, are said to be obtainable by even inexperienced workers with a new meter which can be used with all types of solutions except those containing free fluorine ions. **(No. 729)**

Improved rubberized paper is said to result from a new method for adding rubber latex to pulp. Product reportedly has high wet strength and good chemical resistance, and to be suitable for gaskets, multi-wall bags, and box-paper. **(No. 730)**

A new vinyl light stabilizer reputedly withstands 6,000 Weather-Ometer hours compared with the 1,000-hour maximum for most other formulations. The stabilizer is designed for use in sheeting for raincoats, draperies, shower curtains. **(No. 731)**

A synthetic resin cement that sets hard in contact with concrete and metals, is said to join brick and tile and to adhere glass, concrete, metal, and other materials. Resistance to many acids, solvents, greases, and oxidizing agents is claimed. **(No. 732)**

A plastic substitute for decorative metal is being offered for use in radio cabinets, name plates, signs, etc. The material has a mirror-like metallic appearance, is easily laminated to heavy board, and takes silk screening and other reproducing processes, it is claimed. **(No. 733)**

A leak-indicating machine is designed to test steel drums and other types of sealed containers before they are filled with oil or chemical products. According to the maker, the machine is low priced and can be installed by an inexperienced maintenance man in a few minutes. **(No. 734)**

An anti-rust paint which can be applied over rust without scraping or wire-brushing is claimed to be equally effective in preventing rust on new metal and in stopping rust action on already corroded metal. Available in black and in a clear finish which can be painted over with any standard paint. **(No. 735)**

A new synthetic rubber flooring for industrial applications is reputed to dry to a pleasing light concrete color and to bond inseparably, without preliminary treatment, with wood, metal, concrete, brick, slate, stone, asphalt mastic, composition, and other bases. Good resistance to loads of considerable weight is also claimed. **(No. 736)**

A rust-preventive paper wrapping, designed to protect heavy machinery and bulky metal parts during storage and shipping, is described as being tough, resilient, tear-resistant, and moisture- and water-repellent. Product consists of two kraft sheets cemented together and reinforced with spun glass fibers. The inner sheet is impregnated with a volatile rust-inhibitor. **(No. 737)**

A new all-purpose cleaner, said to combine the advantages of an all-vegetable oil soap with those of a synthetic detergent and an alkaline polysulfate, is formulated for efficient action in hard as well as soft water, either hot or cold. **(No. 738)**

PRODUCTS OF U.S.I.

ALCOHOLS
Amyl Alcohol (Isoamyl Alcohol)
Butanol (Normal-Butyl Alcohol)
Fusel Oil—Refined
Propanol (Normal-Propyl Alcohol)
Ethanol (Ethyl Alcohol)
Specially Denatured—all regular and anhydrous formulas
Completely Denatured—all regular and anhydrous formulas
Pure—190 proof U.S.P., Absolute—200 Proof
Solox*—proprietary solvent—regular and anhydrous
ANTI-FREEZE
Super Pyre* Anti-Freeze
U.S.I. Permanent Anti-Freeze
ANSOLS
Ansol* M
Ansol* PR
ACETIC ESTERS
Amyl Acetate—Commercial and High Test
Butyl Acetate
Ethyl Acetate—all grades
Normal-Propyl Acetate
OXALIC ESTERS
Dibutyl Oxalate
Diethyl Oxalate
PHTHALIC ESTERS
Diamyl Phthalate
Dibutyl Phthalate
Diethyl Phthalate
OTHER ESTERS
Diatol*
Diethyl Carbonate
Ethyl Chloroformate
INTERMEDIATES
Acetoacetanilide
Acetoacet-ortho-chloroanilide
Acetoacet-ortho-toluidide
Acetoacet-para-chloroanilide
Ethyl Acetoacetate
Ethyl Benzoylacetate
Ethyl Sodium Oxalacetate
ETHERS
Ethyl Ether, U.S.P.
Ethyl Ether, Absolute—A.C.S.
ACETONE — A.C.S.
FEED PRODUCTS
Curbay B-G*
DL-Methionine
Riboflavin Concentrates
Special Liquid Curbay*
U.S.I. Vitamin B_{12} and Antibiotic Feed Supplements
Vacotone* 40
RESINS (Synthetic and Natural)
Arochem*—modified types
Arofene*—pure phenolics
Aroflat—for special flat finishes
Aroplaz*—alkyds and allied materials
Congo Gums—raw, fused and esterified
Ester Gums—all types
Natural Resins—all standard grades
INSECTICIDE MATERIALS
CPR Concentrates: Liquid & Dust
Piperonyl Butoxide
Piperonyl Cyclonene
Pyrenone* Concentrates: Liquid & Dust
Pyrethrum Products: Liquid & Dust
Rotenone Products: Liquid & Dust
INSECTIFUGE MATERIALS
Indalone*
Triple-Mix Repellents
OTHER PRODUCTS
Collodions
Ethylene
Nitrocellulose Solutions
PIB*—Liquid Insulation
Urethan, U.S.P.
Special Chemicals and Solvents

*Reg. U.S. Pat. Off.

U.S.I. INDUSTRIAL CHEMICALS CO.
Division of National Distillers Products Corporation

60 EAST 42nd ST., NEW YORK 17, N. Y. U.S.I. BRANCHES IN ALL PRINCIPAL CITIES

October 27, 1951 • Volume 69 • Number 17

Chemical Week

BUSINESS & INDUSTRY . . . . .

Profitable Wonders

New drugs, new plants, and new prices, come thick and fast in the manufacturing of antibiotics.

Barely nine years old, antibiotics now are the largest single item in the entire ethical drug field.

Use in animal feed supplements is fastest growing market for wonder-drugs: seen by some as passing volume used in medicine.

Introduction last week of Commercial Solvents new penicillin salt, Compenamine (l-ephenamine penicillin G), is only the latest change in what is probably the fastest-changing, fastest-growing branch of the chemical industry: the manufacture of antibiotics. Within the last month alone, four other major development have arrived to alter the constantly shifting industry:

- Upjohn Co. began the production and marketing of a new antibiotic, neomycin.
- Pfizer, Lederle, and Parke, Davis cut the price of terramycin, aureomycin, and chlormycetin; they now cost just about half their original price.
- Parke, Davis is at work on the first completely chemical plant for antibiotic production, which, when completed by the end of the year, will double its output of chloromycetin.
- Schenley Laboratories got under way with an expansion of its antibiotic facilities that will up production 30%.

All this within a one-month period draws clearly the picture of an industry moving rapidly under the shadow of constant change. In antibiotics, today's wonder may be tomorrow's also-ran.

Nine Years from Nothing: It was only nine years ago that the first patient treated with penicillin died because there wasn't enough of the drug to cure him. Last year 853,000 lbs. of medicinal antibiotics were produced at a sales value of $214 million.

Antibiotics now account for over 50% of ethical drug sales, and their portion of the dollar value is increasing yearly at a remarkable rate. One dollar for every four spent for prescription drugs in 1950 went for antibiotics.

Penicillin alone has more than tripled production since 1948, and new plants being brought in by five major manufacturers will probably double the figure again by January 1. But so rapid is the change in this field that there is no way to tell what the new Commercial Solvents salt will do to the industry. The company claims it will largely replace procaine penicillin, itself only a few years triumphant over penicillin G, and no one can say what this will mean.

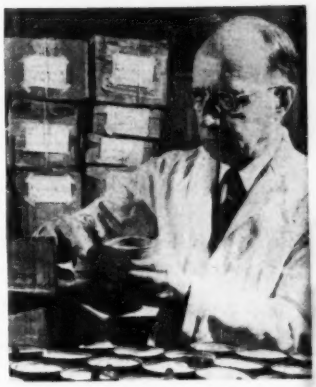
But while production of penicillin has been skyrocketing, dollar value per unit has fallen by nearly two-thirds, as a result of constant improvement in production techniques, and price cutting. Today the point has been reached, in the view of Pfizer President John E. McKeen, where penicillin, and streptomycin, have changed from high-margin specialties to mass-produced, low-profit staples. Their production continues to increase steadily, but the dramatic developments belong to another branch of antibiotics today.

Broad Spectrum: At present the key antibiotics field is the exclusive antibiotic, owned and marketed by a single company. The big three are Pfizer's terramycin, Lederle's aureomycin, and Parke, Davis' chloromycetin (and to some extent Commercial Solvent's bacitracin).

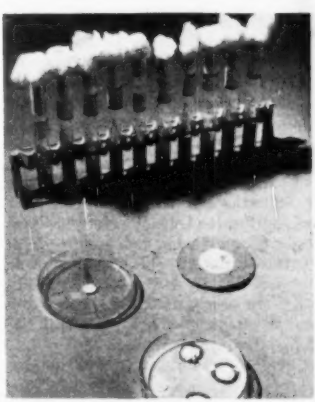
In 1948 not enough antibiotic sales existed outside penicillin and streptomycin to be listed in the Tariff Commission's reports. By 1950 penicillin exceeded sales of "others" by only $3 million—$93 million to $90 million. And "others" are primarily the three broad-spectrums and bacitracin. Today the broad-spectrum antibiotics are selling at the level of $150 million annually, and the potentialities are believed barely scratched.

At present Lederle's aureomycin has the lead in this highly competitive race, but Pfizer and Parke, Davis are running neck and neck hot on its trail. Pfizer will more than double its production by 1952, and terramycin will be the major share of this. The new Parke, Davis chloromycetin plant will double the supply of that drug.

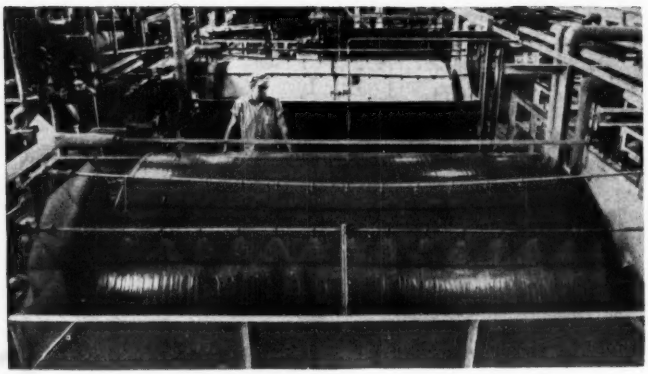
Despite the stiff competition, so wide open is the field, that the companies are actually hard pressed to meet rising demands. What has surprised most experts, and made antibiotics producers whistle while they work, is that no one seems to have lost a market despite the increasing number of products in the field. Aureomycin and chloromycetin were expected to cut into penicillin's market,



DISCOVERY: Soil holds secret.



TESTING: It shows the way.



PRODUCTION: Living organisms mean trouble—and dollars.

but they didn't—they developed one of their own. And terramycin doesn't seem to have hurt the other two broad-spectrums at all.

They just keep on growing—ceiling, apparently, unlimited—expanding at home and abroad at a rate that is even a little startling in an industry that has come from absolute zero in the space of nine years. There seems to be little to stop them, until—and this is always present in this kaleidoscopic industry—new ones come along to grab the ball.

Forty Million Pigs: One of the major reasons for the continuing growth of antibiotic production is the newly opened animal feed supplement market. It is estimated that some 40 million pigs are born annually that fail to reach market, and some 20 million of these can be brought to pork with the aid of antibiotics in their feed.

Some industry men see the feed supplement field surpassing the therapeutic in annual sales volume, and it has undoubtedly caused all major producers to expand capacity far beyond their estimates based on human consumption alone. Lederle estimates that right now as much aureomycin is going into feed as into medicinals.

The big four in feed are aureomycin, terramycin, bacitracin, and penicillin, with the first three out in front. Gigantic sales campaigns are under way selling the feed supplements to farmers who grow pigs and poultry. Estimates of the size of the market fly thick and fast, but conservative figures see a potential market for 200 million grams of antibiotics, and $100 million worth of sales.

Search Goes On: The field is one of never-ending search for new substances, new methods of use, and new markets. All major companies keep their research staffs constantly at work testing soil samples, testing new ways and new products, looking for that new antibiotic that will beat all others, and for new ways to use what they have. Just for example, Lederle alone spent $1 million on its mycology research lab at Pearl River.

Most promising of the new ways to use the established drugs: synergistic effect of certain combinations. The most dramatic so far is Commercial Solvents' combination of bacitracin and penicillin, which has achieved some remarkable successes, but more widely used is the penicillin-streptomycin combination put out by various producers. Pfizer and many others are pushing the combination of streptomycin-penicillin, and sales seem to be growing by leaps.

After the development of the feed supplement market, the search for new markets has slowed somewhat. The looked-for use in food preserving has so far failed rather badly; none of the present antibiotics seems even remotely useful for that purpose, but researchers are still looking.

Other markets are very much in the theoretical stage at present. Work is being done in the use of antibiotics in soaps and cosmetics as germicidal agents, and in industrial uses, such as protecting cables from mold, but little has developed as yet. There is even a whisper that antibiotics may be a better answer than cortisone to the scourge of arthritis.

Of the new drugs, only neomycin and viomycin seem at all promising at the moment. Neomycin is already on the market from Upjohn's Kalamazoo plant, and is well on the way at Commercial Solvents and Heyden. But at present its use is limited to local application, primarily to combat dermatological infections.

Viomycin is still in clinical testing, although Pfizer is ready to go ahead with it when tests are completed. Every major producer has new compounds under study, but the research is narrowing: Experts tend to see any future antibiotics as of very special use. Work is concentrated largely on developing substances effective against specific organisms, rather than as competitors to the present wide-application types. In particular, research is centering around the viruses and tuberculosis.

Future: Despite all the research in the last ten years, only six really effective, usable, and commercial antibiotics have been found: penicillin, streptomycin, (and dihydrostreptomycin), bacitracin, chloromycetin, aureomycin, and terramycin. With the possible addition of neomycin and viomycin, it seems unlikely that this number will be increased in the near future. The industry will probably tend to concentrate on widening the market; selling abroad, where the demand is much greater and disease germs flourish more than at home; increasing production and uses for the present antibiotics.

Who's Responsible

Infiltration of arsenic into an artesian well was the grounds for a negligence suit against the Saracyn Corp. A jury verdict against the company is now upheld by the Connecticut Supreme Court. The decision may help to answer a question vital to the chemical industry: At what point does a company shed—and the individual assume—responsibility for an injury to a worker?

Saracyn is a cacodylic acid producer in West Redding, Conn. Manufacturing processes are carried on in open sheds close to a house occupied by the employee in question.

During the process, arsenic trioxide was frequently spilled on the floor of the sheds. Later the floor would be washed down, the water drained into a septic tank close to the well. Overflow from the tank was discharged into loosely-jointed tile pipes.

Some of the arsenic-containing overflow evidently found its way into the well, for shortly after the employee moved into the house he became ill. He was eventually moved to a hospital where his symptoms were diagnosed as arsenical poisoning. When analyzed, the well water was found to contain 50 milligrams of arsenic per liter.

In its defense, the company said that the man had been poisoned

through his own negligence. It contended that in working and living under those conditions, he assumed the risk of injury.

But the Supreme Court didn't see it that way. Its opinion: "Assumption of risk is available as a defense only when the person injured has or ought to have knowledge of the particular peril to which he is exposed and thereafter continues of his own volition to subject himself to that peril. He may not foresee the exact manner by which the injury may ensue, but to assume such a risk he must know and comprehend that the peril exists."

Building From Within

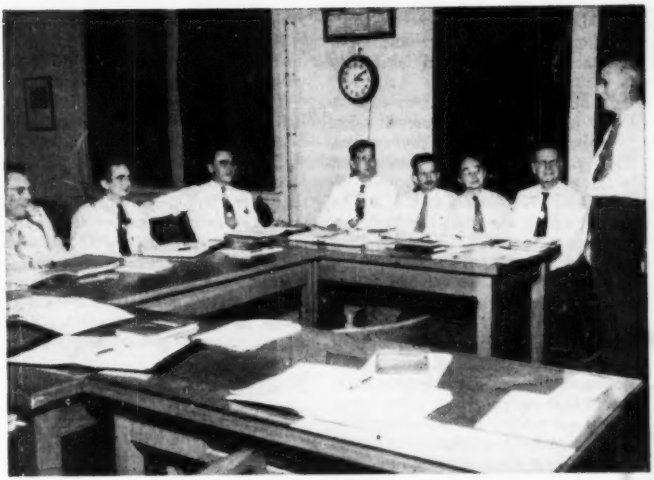
With the chemical industry in a squeeze for top-level personnel (CW, Oct. 6) National Distillers Products Corp.'s business training course seems worth study by worried company officials. Having graduated one class last month and recently started the second group through the course, National's version seems to be one of the more promising approaches to the problem.

Brainstorm of national's president, John E. Bierwirth, the course appears to have many potential advantages for both the company and the employees who go through it.

Broaden the Picture: On the theory that broadening an employee's picture of the company and its operations broadens his use to the company, National expects to realize a rich return on its investment of time and training.

For the company, the course is expected to develop a high morale level by giving the employee a better understanding of his position in the larger picture of the company's entire operations. It is planned to give the young executive a better understanding of his own, and the other fellow's, job; and help to break down the frustrating "pigeon-holing" that is invariably a part of big companies. By showing that the company has the interest, and the intention, to help a new man get to know it, National expects to attract superior men.

Biggest gain for the company, however, is the development of men from within its own ranks for future positions of responsibility. It is the middle-level executive that is missing today, and by planning to build a sound core of such men, the company hopes to prevent future repetitions of the present executive-lack. Continuing expansion in the chemical field means an increasing diversity of operations; and National feels that its course offers the best and quickest way to develop well-rounded executives.



EMBRYO EXECUTIVES: Broadening the picture broadens executive potential.

Take an Interest: For the employee, the course offers a quick and comprehensive means to get to know the company. While completion of the course does not guarantee immediate advancement—its gains are primarily long range—in some cases such advancement has resulted.

By having its top executives participate in the course, and by putting each class in charge of a department head, National gives authority to the course, and acquaints the young men with their superiors.

All Facets: Actual instruction covers all facets of National's operations. Most of the time is spent on production techniques and sales, but everything from administration, through public relations, to the legal side, is covered. Both study and on-the-spot inspection of National's many beverage and chemical plants are part of the course.

The course itself lasts a year, and 15 students go through it at a time. Most of these students are chosen from within the company—chemists, assistant superintendents, engineers, accountants, and all the lower executive levels—but some come directly into the course from outside.

Keep Them Home: Company officials are spending a lot of time and effort on the course. Working on the idea that it is always better to develop an executive from within, National pins a lot of faith in the course as a means of keeping young executive material happy, of making them more useful now, and of increasing their potential usefulness later. It is a long range project, and only time will tell its final value, but it seems a promising positive approach to a current problem in the industry.

Security Plus

The "cloak and dagger" role may be a little out of industry's line, but with Washington growing increasingly security-conscious, industry is going to have to act as if its best customers are potential spies. Chemical industry in particular, deep in military and Defense Department work, is going to be affected by two recent Munitions Board regulations.

MB, the agency responsible for making plans and policies for security of classified information with industry, has directed that the Defense Department's industrial security manual be incorporated as a clause in Government contracts from now on. MB doesn't have the power to enforce its regulations; that's the job of the military service doing the contracting. But MB tells industry what to do, and the military wields the club. And right now the military is getting ready to clamp down on violators of MB rulings. Spot checks are in the offing for industries with military contracts.

Get It in Writing: While the MB is getting tougher on what industry has to do, it's also getting tougher on paying for any costs incurred by complying with its orders. The Board de-

clares that the Government will not be obligated for security costs resulting from the security agreement unless these costs are already agreed to in written contracts.

In other words, if industry expects to be paid for the measures it takes to make plants safe from prying eyes, these measures must be spelled out in the contracts beforehand.

Nothing Personal, But . . .: The second ruling says that the businessman has to get cleared for handling classified information before contract negotiations can even begin. This means a security check of businessmen themselves. Not that the Government thinks that the ranks of American business are filled with Communist spies; it's just routine. Seems that someone found that regulations are written in such a way that military contracting officers can't even begin talking about classified material until prospective bidders are cleared to hear it!

To help the confused businessman find his way through the paper work to his contract, MB has issued a booklet giving the "what and where" of getting clearance to handle classified material. If you should want this booklet, the Government Printing Office has it—10c a copy.

Manage With Less

The oft-rumored, long-awaited sulfur allocation cutbacks were unveiled in Washington last week. With some exceptions, users of sulfur and sulfuric acid will have to get along with 90% of 1950 levels.

In revealing the cuts, the Defense Production Administration said that under the rate of sulfur use currently allowed (100% of 1950), supplies are falling short of permitted demand. The cut will become effective on Nov. 1.

Exceptions to the 90% limitation will be made, according to DPA, for public health uses, agricultural insecticides and pesticides, rubber, and military explosives.

Object of the order is to force users to adopt conservation measures and encourage use of substitutes. While sulfur production should meet demands, come 1953 (*CW, June 30, Sept. 8, Sept. 22*), present supplies are definitely tight.

DPA will not do the restricting itself, has directed the National Production Authority to draw up the orders under which industry will operate.

Industry Breakdown: While NPA hasn't gotten anything out officially, the main points of the program are clear:

- Sulfur use for making sulfuric acid or carbon bisulfide is cut to 90%, with exceptions mainly as listed above.
- Users of carbon bisulfide are limited to 90% of 1950 for the manufacture of cellulose film or rayon.
- Sulfuric use is cut 90% for manufacturing aluminum sulfate (other than for public water treatment), synthetic detergents (for non-industrial use), lead, zinc and titanium pigments, dyes, cellulose film, rayon, in textile finishing (including sulfonated oils), tall oil, and—as CW predicted (*Newsletter, Oct. 20*)—in production of phosphate fertilizers.

Bigger Role

The Wage Stabilization Board is apparently getting ready for a bigger role in labor disputes involving defense production. Evidence is the recent borrowing of Peter Seitz, assistant to Federal Conciliator Cyrus S. Ching, to organize machinery and procedures for handling labor disputes which may come to it.

Since its labor members walked out in April, WSB has had some limited functions in labor disputes, but its authority is far less than World War II's War Labor Board. WSB may not intervene on its own, and disputes come before it in only two ways: (1) The President can refer a dispute to the Board as one having a serious impact on national defense. Or (2) both sides to a dispute can jointly, and voluntarily, request WSB to consider it.

In either case the Board will only issue recommendations, unless both sides, in the case of voluntary submission to the Board's decision, request a final and binding decision.

Reluctant: Actually the Board has been extremely cautious up to now. It will not consider a dispute if it does not affect defense production seriously. Neither will it consent to review the dispute unless normal collective bargaining, Federal mediation, or other means of settlement, have been thoroughly and exhaustively resorted to. In short, the Board wants no part of disputes until they are of national concern, and until the disputants have shown genuine desire to compromise.

So far the Board has issued a recommendation in only one case sent to it by the President—the dispute between the CIO steel union and American Smelting & Refining Co. in the copper strike of late August. WSB sent the case back to the White House when the independent Mine, Mill & Smelter Workers refused to stop striking while the Board considered the case.

BORROWED SEITZ: Labor is his baby.

As for voluntary submission of disputes, the Board has accepted none so far, and has rejected several. Apparently WSB is going to step softly in disputes not sent to it by the President.

Toward Unsnarling

One milestone in the complicated litigation over General Aniline & Film and General Dyestuffs came last week when the Supreme Court refused to consider Remington Rand's claim of an option to buy stock control of GAF.

The refusal is ony one step in a potpourri of legal battles over GAF and its selling agent. The two companies have been under government control since shortly after the start of World War II, when they were seized as American arms of the I. G. Farben trust.

Present Status of GAF: Ownership by the government is disputed by a Swiss holding company, Interhandel A.G., formerly I.G.Chemie, which had been associated with the I.G. Farben trust in more than name.

Interhandel claims that as a Swiss corporation which controlled almost 100% of GAF stock at the time of seizure, GAF could not be considered as property of enemy aliens.

An agreement by which Farben guaranteed Chemie's dividends and Chemie gave Farben an option to buy its foreign properties at book price was cancelled in 1940. This cancellation is the basis for the contention that Chemie was independent, and that the seizure was illegal.

The government's case is based on the contention that Swiss ownership was illusory, and effective control was still actually in the hands of the German I.G. Assuming this, the government claims its seizure was valid.

The situation is complicated by several factors: General Aniline owned 30% of the stock of I.G.Chemie, which was given to the government as part of three GAF dividends. Later, due to a change in stock registration and in company name by the Swiss concern, the government's position as a significant minority stockholder in a claimant against it was in question. The government, therefore, negotiated with GAF, which agreed to buy back the Chemie stock if the government insisted.

It hasn't so far. Whether the U.S. could convert its stock into the new issue has never been tested in the courts.

Another Factor: Remington Rand supposedly had its option on purchasing control of the company from the Swiss. The validity of the option was clouded in the smoke which surrounded the legal maneuvers to Americanize GAF (which was then called American I.G. Chemical Corp. and had as its two operating subsidiaries General Aniline Works and Agfa Ansco). According to Rand, it was an option to buy control for $25 million, which was dated before the seizure—and therefore legal.

Thus, when Interhandel filed suit in Federal district court to regain control from the government, Rand intervened on the basis of the option. After involved legal maneuvers, the court ruled that Rand had no valid option and dismissed the intervention. On appeal, the Circuit Court of Appeals affirmed the lower court's decision. The Supreme Court's refusal to review the appeal court decision has closed this avenue to Rand.

BAYNTON: Toward disentanglement.

The Case on GDC: Control of General Dyestuffs, seized in 1942, is being contested in New Jersey Federal Court. At the time of the seizure, nominal owners were Americans. In 1945, the Alien Property Custodian, apparently unsure of his ground, settled out of court with owners of the stock. They were paid $118 per share (against a book value of better than $500).

This method of settlement is being contested. The owners contend that their rights were abridged by settlement previous to a full hearing in Federal court.

Senate Steps In: Latest move in this case, surprisingly, came on Capitol Hill. Here, Senator Tom Connally, chairman of the Foreign Relations Committee, introduced in committee an amendment to a bill ending the state of war with Germany. The amendment would allow any citizen whose property was acquired by vesting (seizure) or otherwise by the Alien Property Custodian, and who entered into a compromise or release of a claim without a full hearing in court on the merits of the seizure, be allowed to go into court and seek to recover the property in controversy.

This, obviously, includes General Dyestuffs. Despite the sponsorship of Administration stalwart Connally, the Administration in general is opposed to the amendment.

Fears have been expressed in the office of Assistant Attorney General Howard Baynton (who inherited control of alien properties) that this amendment very probably would affect "hundreds" of other cases where settlements have been made.

Future Outlook: The legal status of General Aniline and General Dyestuffs isn't anywhere near settled. Not only will the present court cases have to be completed (or out-of-court settlements consummated), but several other factors will have to be dealt with.

First of all, in Dyestuffs' case, outcome will depend on what happens to the amendment mentioned above. If it is passed, odds are that former owners will be able to regain control.

On General Aniline, Remington Rand may not be out of the case after all. The company terms the Supreme Court refusal only a "first rebuff" which end litigation in the U.S. However, it says, there are "many other avenues" it can take in its fight.*

Real uncertainty—at least to those who work for the companies—comes from the fact that it has at times been a political football.

Whitout a clear-cut decision as to its ownership, the full potentials of the company might not be realized.

Especially apropos here is the company's Ozalid division, which has a great potential market for its business-form duplicating machines.

Dyestuffs, too, are a field where a well rounded research-development program could pay off handsomely.

The possibility that Interhandel A.G. will be able to reacquire the Aniline property was heightened recently when the Supreme Court ruled in a somewhat analagous case concerning a magneto company. The question was where ownership really rested —in the German parent concern or in a Swiss one which once was a subsidiary. The court, ruling here that the Swiss really owned the American firm, allowed them to recover control.

This case could be a precedent to the present one over GAF, but undoubtedly it is only a single point in the continuing legal battle.

By-Product Profit

A definite trend towards pulling profits from chemical and pharmaceutical by-products was evident in the Armour & Co. financial report for 9 months of the 1951 fiscal year.

For the nine-month period, 79% of the meat packer's total products came from its non-food products. Armour reported food and non-food earnings separately for the first time last year (*CIW, Jan. 27*) and indicated that 58% of its profits came from chemical and other non-food operations. The increase apparently came through a narrowing of profit margin on food operations.

Armour, for the nine month period, showed total earnings after taxes of $13,200,027 of which non-food operations accounted for $10,415,483 and food operations, $2,785,444. The real picture, though, comes in percentage profit: Non-food operation profit on sales was 4.5% while food processing showed a mere 0.2%.

* While Rand's interest in the Ozalid and Ansco divisions of Aniline is easily seen, many chemical observers are wondering about the dyestuffs and other divisions. Unless Rand is empire-building, they see sale of these operations (if the company is acquired) to some basic chemical producer. Two chances: Monsanto, at present a large supplier to General Aniline of dyestuff intermediates, or perhaps Phillips Chemical, GAF's partner in Alamo Chemical.

BROADCAST PRINCIPALS* AND RESCUE SQUAD: Two of the fifteen services Ansul offers its twin-city community.

A Stake in Two Cities

As a result of it unusual community relations program, Ansul Chemical Co. (Marinette, Wis.) is one of the highly regarded citizens of Marinette and Menominee, twin cities of Wisconsin and Michigan. That's why management figures that money—to establish and support a local rescue squad, for radio programs and other services—is not a simple expenditure, it's an investment.

At 4:30 A.M., last Thursday, just twenty seconds after the gatehouse phone started to jangle, a rescue squad was on its way. Within 150 seconds, a family had been evacuated from a gas-filled house and were receiving oxygen.

That sort of work would be routine for a municipal fire or police department. But the squad was the one formed and financed by Ansul as part of its program to foster better relations with the community.

Since its inception two years ago, the squad has answered 85 calls for help in cases of fire, drowning, asphyxiation, electric shock, heart attack and automobile accident. It has become such an integral part of twin-city life that townsfolk in distress often call the Ansul squad first, the police or fire department second.

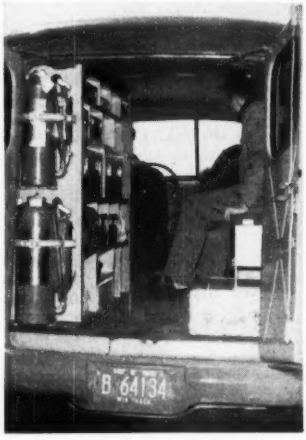
Ansul's rescue squad is made up of eighteen volunteers (with a long list of eager would-be members) on call 24 hours a day. The company has been so pleased with its reception that it has recently donated a new panel truck, complete with $4,000 worth of emergency equipment.

* Ansul representative Dick Baker (right) discusses program format with Station Manager Joseph D. Mackin (seated, center), Announcers Ruth Mensing and Bob Southard.

Only Part: The rescue squad, however, is ony one of the fifteen services that Ansul offers the community. A radio broadcast, Your Social Reporter, is a five-minute program dedicated to news of meetings, parties, bazaars, and other local events. Commercials are confined to the simple identification of the sponsor at the beginning and close of each broadcast.

On the average, Ansul lends its motion picture equipment 150 times a year; frequently it supplies the projectionist as well. And religious and civic groups are frequent users of the company's modern mailing equipment.

In addition, Ansul offers help to high school students—tomorrow's employees—in many ways. The tabulating department is open to students of commercial subjects. Ansul takes ads in all the local yearbooks, gives editors advice on problems concerning pictures, copy and layout.



RESCUE TRUCK: Complete with $4,000 worth of emergency equipment.

Citizenship: Like other chemical companies, Ansul realizes that a portion of its future is in the hands of the local residents. And aside from other considerations, Ansul feels, like every other citizen, it has a stake in the welfare of the twin cities.

EXPANSION. . . .

Diatomite: Production of diatomite filter aids and fillers will be increased by 60% in the new plant of the Dicalite Div. of Great Lakes Carbon Corp. The new unit, at Lompoc, Calif., should be completed next spring.

•

Hydrogen Peroxide: Buffalo Electro-Chemical Co. plans to start operation of its $4.3 million hydrogen peroxide plant at Vancouver, Wash., on Jan. 1. Full-scale production should be under way by September 1952.

•

Sulfur Dioxide: Construction has started on Brown Co.'s new burner for manufacture of sulfur dioxide from pyrrhotite at Berlin, N.H. Concentrates (the tailings that remain after copper concentrate has been removed) will be obtained from Vermont Copper Co. at S. Stratford, Vt. With an initial capacity of 9,000 tons of equivalent sulfur per year, the plant is being laid out so that this capacity can be easily doubled.

•

Ferro-Alloys: The newly-formed Tenn-Tex Alloy & Chemical Corp. will erect a $1-million plant on the Houston Ship Channel for production of ferromanganese, ferrosilicon and other ferro-alloys. The three electric furnaces will be erected by H. K. Ferguson Co., will use about 5,000

Riding on Resin-Glass

NEW USE FOR PLASTIC comes in replacing steel tie plates on railroad tracks. The Erie Railroad is testing 6,000 of the plates installed on a mile of heavily used freight trackage in its Cleveland yards. The plates are made of a Fiberglas-polyester resin laminate developed by Dynakon Corp., Cleveland plastics firm. The plates weigh one-fifth that of steel and, because of their resiliency, last longer and protect the ties from being cut by the rails. Unlike steel, they are unaffected by brine solution from refrigerated cars dripping onto tracks. Only disadvantage: Plates can be cracked during installation if sledgehammer hits plate rather than the mounting spike.

tons of imported manganese ore per month.

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Phenolic Resins: The Chemical Plants Div. of Blaw-Knox Co. will construct new phenol-formaldehyde resin facilities for Catalin Corp. at Fords, N. J. The expansion is expected to go into operation about July, 1952.

•

Fine Chemicals: Completion of the new fine chemicals plant of Pittsburgh Coke & Chemical Co. at Neville Island, Pa., is scheduled for the late spring of 1952. Construction will be carried out by Process Industries, Inc., of Pittsburgh, Pa.

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Testing Laboratory: Francis P. Owens and Gerald O. Freeman, staff members of Lauck's Laboratories, Inc., Seattle, Wash., have purchased its analytical, sampling and testing facilities and now are operating as Lauck's Testing Laboratories, Inc.

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Fiber Glass: Ferro Corp. has started construction of a fiber glass plant at its Nashville, Tenn., plant. Initial phase of the construction, by Foster & Creighton Co., will cost about $500,000; an additional half-million dollars will be expended before completion of the plant by September, 1952. Ferro is licensed under the Owens-Corning Fiberglas patents.

KEY CHANGES . .

Malvern J. Hiler: To president, Commonwealth Engineering Co.

Richard L. Demmerle: From executive editor, CHEMICAL WEEK, to assistant director of administration, General Aniline & Film Corp.

T. P. DeFarkas: From manager of direct sales, overseas division, E. R. Squibb & Sons, to general manager, export division, Commercial Solvents Corp.

Frederic C. Sands: From assistant sales manager, antibiotic division, Chas. Pfizer & Co., to sales manager, C.S.C. pharmaceuticals, Commercial Solvents Corp.

O. M. Williams: To assistant to vice president in charge of manufacturing, Shell Chemical Corp.

Thomas G. Crane: To managing director, Monsanto Chemicals (Australia) Ltd.

James H. Crow, Jr.: Appointed administrative assistant to the president, Chemstrand Corp.

Louis Lerner: To second vice president for product development, Tintair division, Bymart, Inc.

Peter W. Sherwood: From Koppers Co., to senior engineer, chemical plants division, Blaw-Knox Co.

Richard W. Plummer: From vice president, E. R. Squibb & Sons de Mexico, to head of new Latin American office in Mexico, Arthur D. Little, Inc.

Dwight F. Benton: To vice president in charge of sales, Standard Oil Co. (Indiana).

V. R. Farlow: To sales supervisor, petroleum chemicals department, American Cyanamid Co.

G. L. Glespen: To technical supervisor, petroleum chemicals department, American Cyanamid Co.

Samuel O. Sorensen: Elected to board of directors, Archer-Daniels-Midland.

Osgood V. Tracy: On leave from chemical products department, Esso Standard Oil Co., to deputy director, Chemicals Division, National Production Authority.

FOREIGN. . . . . .

Benzene: Great Britain has under way further expansion of its benzene production facilities. The National Coal Board has begun work on the biggest and most modern coking plant in Europe: It will cost nearly $22½ million and be four years a-building.

The 200-acre works near Chesterfield, Derbyshire, will carbonize 750,000 tons of coal annually in its 106 ovens. It will also annually produce 500,000 tons of coke, 3 million gallons of crude benzene, and 6 million gallons of crude tar for coal chemicals.

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Glycerine: Colombia's first glycerine factory is under construction at Bucaramanga. The new plant will produce 22,000 kilos per month, go on stream in 1952.

At present Colombian soap factories are discarding as waste enough glycerine water to make 1,244,000 kilos of glycerine a year. The government is starting a drive to correct this, and the new plant is to be the first stone in building a domestic glycerine industry.

The glycerine will probably be used to produce domestic dynamite, since the other necessary raw materials are plentiful in Colombia.

•

Styrene Monomer: Although Forth Chemicals, Ltd.'s styrene monomer plant at Grangemouth, England, is

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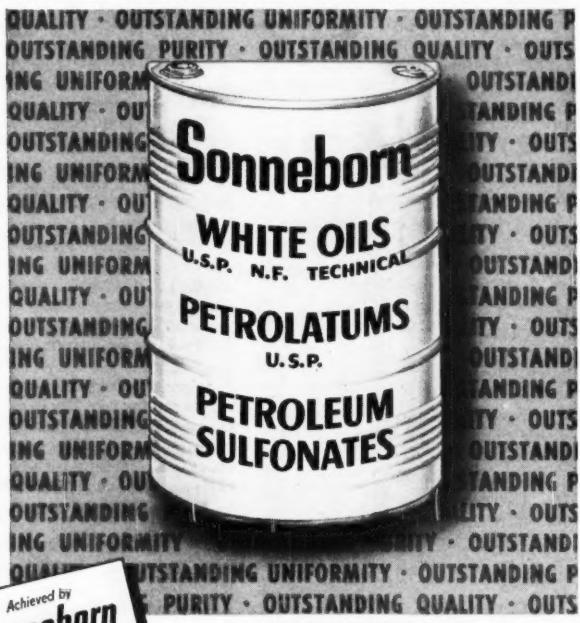
NOVADEL-AGENE CORPORATION
BUFFALO 5, NEW YORK



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still in the building stage, the company is already starting work on an expansion. Original plant will go on stream in 1952, and the expansion in in about 1954.

Forth Chemicals is a co-subsidiary of Monsanto Chemicals, Ltd., and British Petroleum Chemicals, Ltd., (jointly owned by Anglo-Iranian Oil Co. and Distillers Co.).

•

Wood Pulp: The search for new sources of cheap wood pulp has reached the remote Belgian Congo. A new syndicate, composed of a Congo company, the colonial government, the U.S. Brown Paper Co. and the *Reader's Digest*, is studying the possibilities of using the abundant wood in the Congo River's estuary.

Another syndicate, formed some time ago, is already investigating the potentialities for pulp in the papyrus sedge that grows thickly near the source of the Congo River.

Still another development in the pulp field is a new straw cellulose factory to be opened at Arnhem, Holland, in early 1952. It will produce cellulose for the paper industry in Holland, but other possibilities may be in the wind, judging by the fact that nearly half the capital is being supplied by AKU, the rayon concern. The rest of the capital comes from the Dutch government.

•

Italy: Discovery of natural gas (methane) in the Po valley has given a big boost to the Italian fertilizer, ammonia, and methanol industries. Montecatini has a pilot plant in operation producing urea from the gas, and three full-scale factories are in the process of construction, at Novara, Ferrara, and Venice, for producing ammonia.

The plants at Novara and Ferrara will have a combined output of 300 tons of ammonia a day by early 1952.

•

Synthetic Rubber: Synthetic rubber (Buna) production will be resumed in Germany for the first time since the end of the war, when Huels Chemical Works goes back on stream this month. Initial production of about 560 tons a month is expected, with an increase to 1500 tons by early 1953.

In addition, the German company's Leverkusen works will resume production of Buna-N in November. Initial production will be 100 to 120 tons a month.

Research: Who, Where, How Much

Research in the U. S. is now a 165,000-man job. Growth—particularly in the chemical and petroleum industries—has been nothing short of phenomenal.

Relatively few companies in those two industries hire most of the technical men—and they are concentrated in relatively few states.

Employment of engineers is rising most rapidly, but rising expenditures on research per dollar of output spells opportunity for all types of technical men.

by George Perazich

Researchers, together with administrative executives and the necessary supporting personnel—laboratory assistants, glass blowers, instrument makers, clerks, librarians, and other—represent a U.S. "research industry" of considerable magnitude, employing upwards of 165,000 persons.

That research has been profitable in the past, and is expected to be more and more so in the future, is evidenced by the phenomenal growth of laboratory staffs over the last three decades.

GROWTH

Keeping pace with production workers in such fast-growing industries as plastics, synthetic fibers, drugs, aviation and electronics, the number of people employed in research by these and all other manufacturing industries combined has grown rapidly from a mere 17,000 in 1927 to over 165,000 in 1950. In the same period, companies maintaining research laboratories as adjuncts to their engineering and sales organizations increased in number from 926 to 2,795; the number of laboratories themselves increased from 1,147 to 3,313.

This growth cannot be measured accurately in dollars and cents of expenditures, to be sure, or even in the number of people employed; there are areas of disagreement as to what actually constitutes research, and such expenditures seldom are budgeted separately. Nevertheless, the data on research staffs which have been assembled by the National Research Council in a series of surveys from 1920 to 1950 provide a rough index of this growth and point up certain trends and the relative magnitude of research in the several industries under consideration.

Chemicals Lead: From their inception, the chemical industries have been prodigious employers of research workers. In 1950, they ranked first among all industries, and their staffs represented one-fifth of all researchers employed in manufacturing.

That they have not expanded even more rapidly during the past thirty years, in comparison with all industries combined, is due in part to their relative maturity, in part to the emergence of several new industries, such as electronics and aircraft.

Analysis of the NRC figures shows that in 1927 the companies engaged in the manufacture of industrial, organic and inorganic chemicals, drugs and medicines, edible oils, paints, synthetic fertilizers, other chemicals and allied products employed some 3,500 researchers and their assistants. Thirteen years later the total was boosted to nearly 15,000—a growth of about 330% during this interval, or something like 25% per year.

In the decade between 1940 and 1950, these same groups of industries more than doubled their laboratory personnel, to nearly 33,000 scientists and their assistants, recording a net annual gain of about 12%. For all manufacturing industries combined, the gain was 13.6%.

Big Seven: Among the chemical companies employing the largest research staffs in 1950, Du Pont dominates the picture with more than 5,000 people. After Du Pont, the big three are Union Carbide, American Cyanamid* and Dow Chemical, each of which last year supported laboratories manned by more than 1,200 persons.

Monsanto and Hercules Powder, both extremely research-conscious in the past, maintained research staffs nearing the 1,000-person mark. These seven companies were the leaders in chemical research in 1950, and employed that year more than a third of all scientists and their assistants reported by chemical companies.

Increases in chemical research staffs are but one measure of growth; the ratio of such staffs to the total number of workers engaged in production is another. According to this yardstick, the chemical industries have not fared quite so well.

Between 1927 and 1937, the ratio of total research staff personnel per 10,000 production workers increased from 137 to 303, or a little more than 12% per year. On the other hand, in the interval between 1937 and 1950, the increase was from 303 to 657, representing an average gain of only 9% per year.

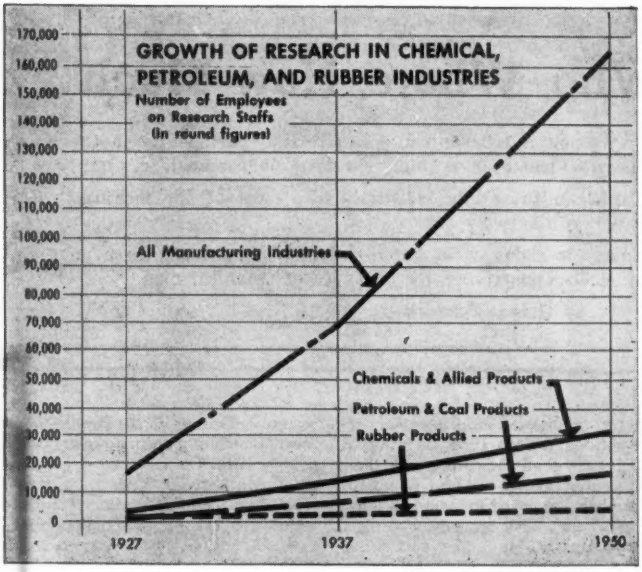
Both indices of growth show that during the past decade, as compared with the '30s, there has been a slowing down of research growth. Both the rate of actual gain in research personnel and the increase of the ratio (of such staffs per 10,000 production workers) slowed in the '40s.

No doubt this is due to the maturity of many chemical industries as well as to the fact that in their formative period a vast volume of new knowledge was assembled in their

ABOUT THE AUTHOR

George Perazich, an engineering associate with Straus & Perry, management consultant firm in Washington, D. C., has studied economic aspects of atomic energy for the University of Chicago, was for five years a research engineer with the National Research Project, has been a consultant to Research Advisory Service, Buffalo, and staff engineer at Western Electric.

* Allied Chemical & Dye Corp. belongs here, but it furnished no figures to the NRC, is thus not included in the survey.



research laboratories and drawn upon later for the development of new products and services. Better organization of research and more efficient utilization of scientists have also played a significant role, as have better equipment and better apparatus with which research laboratories have been supplied.

Depression Baby: Contrary to the general notion that research is less costly in periods of prosperity and high excess profits taxes, and that therefore management can afford to undertake new projects for "rainy days," if the figures presented here are indicative of the general trends, such expansion has not materialized. Quite the reverse is true. Apparently, the need for new and improved products is felt more keenly in periods of depression when competition for markets is sharper.

Of course, there are also other reasons. In the case of the slower increase in the ratio of research staffs to production workers, it may be that in periods of low economic activity it is far easier to discharge factory labor than experienced laboratory personnel. In prosperous times, on the other hand, it is more difficult to hire new scientists, especially during war booms, when the manpower pinch is felt acutely by all industries.

Then again, less accuracy in reporting to the NRC in earlier years, and less complete coverage of chemical laboratories, may have contributed to the slow-down exhibited by the growth of total staffs and by the ratio of such staffs to the number of production workers employed.

Any or all of the above factors may have counted towards this decline, but the important fact remains that in 1950, for every 10,000 production workers engaged in the manufacture of industrial chemicals, paints, drugs, medicines, and allied products, there were about 660 scientists and helpers working in laboratories.

For all manufacturing industries combined, behind every 10,000 workers engaged in production there were only 130 scientists and their assistants. In this respect, the chemical industries expended approximately five times as much effort than was the average for all industries engaged in manufacturing.

Nor is such a relationship surprising: The chemical industries were born in test tubes, while some of the older industries, such as home-building, still largely use the production techniques inherited from the nineteenth century.

Petroleum Coming Up: The expansion of research in the petroleum industry has been even more pronounced than in chemicals. Here laboratory staffs increased from something like 800 persons in 1927 to 7,200 in 1940. Over that thirteen-year period, which was characterized by a serious economic depression, there was an increase of some 800%, or an average of more than 60% per year. This is more than double the rate of growth in the chemical industries.

Research staffs continued to grow during the '40s but at a somewhat slower pace, and by 1950 the petroleum industry maintained on its payrolls about 17,000 scientists and their assistants.

Much of this growth can be attributed to the expansion of old established petroleum research centers and, to a lesser extent, to the change in industry classification.

The figures for 1927 and 1940 cover only the staffs of oil companies and those associated with the petroleum industry, while in the 1950 figures certain laboratories devoted to coke and by-products research are also included.

The automobile and aircraft industries, and the development of synthetic rubber, have provided the greatest stimulus to research in petroleum products. Recent improvements in the design of internal combustion and jet-type engines have made imperative the development of fuels and lubricants with more exacting specifications.

Over the past decade, research workers at an average of about 1,000 per year were added to the laboratories operated by the petroleum industry. This represents an increase of nearly 14% per year; a rate about 2% higher than for the chemical industries, and equal to that for all manufacturing industries combined. However, as compared with the '30s' research personnel growth of some 60%, there was a considerable decline in the rate of expansion.

Ratio Tapers: When the index of growth is considered as the ratio of research staffs to production workers, the petroleum industry follows a pattern similar to that of the chemical industries. According to available data, in 1927 there were only 33 petroleum research workers employed in laboratories for each 10,000 production workers. By 1937 there were about 200 researchers and their assistants behind every 10,000 factory workers, and by 1950 more than 900. For the earlier period the annual rate of growth in this ratio was 53%, and for the later, 34%.

While the deceleration appears to be considerable and could be attributed to the same factors mentioned in connection with the chemical industries, oil companies today probably employ more researchers and other supporting personnel in relation to production workers than any other industry in America. Furthermore,

irrespective of the accuracy of these trends, the important fact remains that in 1950 there were more than 900 workers engaged in petroleum research for each 10,000 of those in production.

Considering that many oil companies have developed substantial foreign operations, the above ratio may be on the high side.

Among the major oil companies maintaining large and well-equipped laboratories, Standard Oil Development Co., with its affiliates, is by far the largest. According to an analysis of NRC data, in 1950 this company employed more than 2,600 research workers, Shell Development Company, Standard Oil of Indiana, and Texaco ranked next in importance; each employed in the neighborhood of 1,700 scientists, assistants, and other supporting personnel.

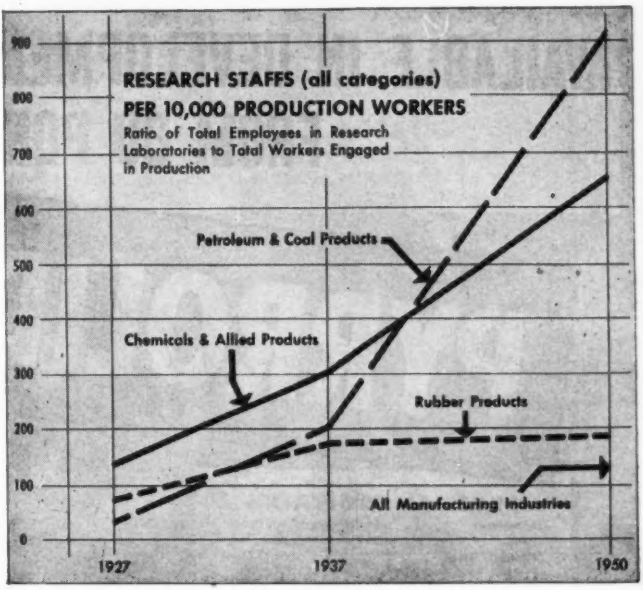
Gulf Oil supported a 1,600-man research staff, and Socony-Vacuum had about 1,100. Standard Oil of California researchers numbered about 900, and those of Phillips Petroleum, Humble Oil, Sinclair, Atlantic Oil, and Sun Oil, ranged from 300 and 550.

The total combined staffs of these twelve oil companies came to about 13,250 people in 1950 and accounted for more than three-quarters of all scientists and their assistants maintained by the petroleum and coke products industries.

Rubber Firms Lag: Manufacturers of tires and other rubber products continue to employ substantial research staffs, but the expansion of such staffs has not kept pace, during recent years, with the chemical and petroleum industries, and was considerably slower than that for all manufacturing industries combined. Important advances have been made during the past decade—especially in the development of synthetic rubber—but these strides were made principally by the chemical and oil industries. It would thus appear that rubber manufacturers have been generally content to improve their own products and use the synthetic raw materials developed for them by other industries.

During the period from 1927 to 1940, research employees of rubber manufacturers increased from 1,100 to 2,500, representing a yearly gain of about 10%, as compared with 25% and 60%, respectively, in the chemical and petroleum industries.

The war effort in the '40s, especially that connected with the aviation industry, led the rubber companies to enlarge their research staffs so that in 1950 they employed about 3,800 persons in their laboratories. The recorded growth of research during this decade was only about 4% per year, which is far under that of any industry considered here.



Employing the ratio yardstick of research staffs to production workers, there were very small advances in this industry from 1937 to 1950, when the proportion of laboratory employees to 10,000 production workers increased only from 173 to 187. For each 10,000 workers employed in tire and other rubber products plants in 1950, there were less than 200 scientists and auxiliary personnel working on research projects. As illustrated above, in the chemical industries nearly 700 were employed, and in petroleum over 900.

Allowing some margin for error in these trends, they nevertheless show that manufacturers of rubber products did not find it necessary to expand their staffs as rapidly nor to undertake new research projects.

The three largest producers—U.S. Rubber, Goodyear, and Goodrich—each of which employed about 1,000 researchers and assistants in 1950, have, in fact, branched out into new fields and are now devoting much effort to research dealing with the aircraft, plastics and chemical industries. Goodyear's affiliate, Goodyear Aircraft Corporation, last year devoted nearly seven times as many man-hours to aeronautical research and allied sciences as were devoted by rubber research laboratories to the development of tires and other rubber products. Sizable staffs at B. F. Goodrich and U.S. Rubber Laboratories work on vinyl resins, plastic coatings, pesticides, and other chemicals, while Firestone expends considerable effort on steel products investigations.

PERSONNEL

The technical problems that require solution, and the selection of fields of inquiry by research laboratories, are often very complex and difficult. As an investigation proceeds up the line from theoretical assumptions to various stages of experimentation and testing, a wide variety of problems must be solved, some requiring the knowledge of chemists, others the services of engineers, physicists, or metallurgists. Moreover, for the manufacture of laboratory equipment, frequently a vast assortment of skilled artisans is needed, from glass blowers to expert instrument and apparatus makers. For performing routine tests, checking computations, and preparing abstracts, trained assistants, clerks, librarians and typists are all essential.

Among the professional staffs, engineers and chemists predominate in almost all industries, with physicists and metallurgists coming next in importance. Biologists are employed

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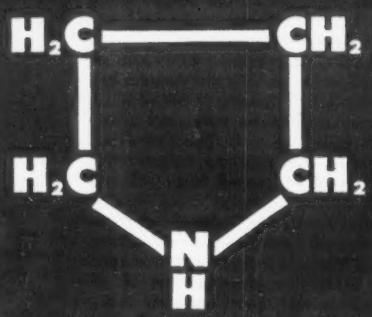

PHYSICAL PROPERTIES

Appearance	Colorless, mobile liquid
Odor	Penetrating, amine-like
Molecular Weight	71.12
Freezing Point (Tech. Grade)	−63°C.
Boiling Point	86-87°C.
Specific Gravity, 20/4	0.8618
Index of Refraction, N20/D	1.4430
Flash Point (Tag Closed Cup)	3°C.
Solubility	Miscible with water and most organic solvents

In water forms base with dissociation constant of 1.3×10^{-3}.

This cyclic secondary amine is now being produced synthetically and is potentially available in commercial quantities. A wide variety of unusual compounds can be formed by reactions involving addition, condensation, acylation, and alkylation. Outstanding chemical properties include the following:

Moderately strong organic base. Solubilizer for acidic materials.

Functions as a catalyst and reaction medium for certain organic reactions.

Highly reactive, versatile chemical intermediate which may afford a practical way to make profitable products. For example:

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principally in the laboratories maintained by producers of foods, drugs, and medicinals; in 1950 these and related activities engaged some 700 of them. Geologists also are being used increasingly in research, and over 300 were employed last year by the petroleum industry alone.

The most recent NRC shows that over 300 M.D.'s are engaged in industrial research, principally in the drug and medicinal industries.

Better Management? When considering the 1950 research staffs of all industries combined, it is found that approximately 42% were professionally trained scientists having earned at least a college degree or doing work of professional caliber. The rest were laboratory assistants, technicians, and other similar aides.

The proportion of professional scientists engaged in research declined, however, during the last decade, since in 1940 they represented 52% of the total personnel. Over and above any incomplete reporting to the NRC, this change may well be due to better organization of research laboratories. It appears that laboratory managers have been able to organize the work in such a way that many tasks formerly performed by professionals could be routinized and turned over to non-professionals.

Decline of the Chemist: Comparison of the 1940 proportion of different professions employed in industrial research laboratories with 1950 shows significant changes. The use of research chemists in relation to total professional personnel, for instance, declined from 44.5% in 1940 to about 33% a decade later. There was also a relative decline in the number of physicists and metallurgists between the same periods, while research engineers increased from 42% to 51% of total professional personnel employed.

One important reason for the jump in engineers: The tremendous recent growth of aircraft and allied industries, and also of electronics, where engineering skills are likely to predominate.

Another factor contributing to the relative decline in the proportion of chemists, physicists and metallurgists and the corresponding increase of engineers: Of late more emphasis is being placed upon engineering developments of new and better equipment and materials, principally for military uses, and less on fundamental investigations designed to store up new basic facts. For the latter, chemists, physicists and metallurgists would generally tend to predominate.

That this shift in emphasis is of some significance can be seen in the chemical and petroleum industries. In the total research personnel employed by laboratories of chemicals and allied products industries, there was a decline in professional staffs from 83% to 48% between 1938 and 1950. In oil company laboratories, the decline was much smaller—from 52% to 39%—and in those supported by rubber manufacturers, from 60% to 50%.

Similar changes have also occured among the different professions. For example, in the chemical industries the proportion of research chemists declined from over 50% of total laboratory staffs in 1938 to about 30% in 1950. The ratio of research chemists in the petroleum industry declined from 20% to 15% and in the rubber industry it increased from about 22% to 27%.

Research engineers, on the other hand, retained their relative position in the chemical industries. In petroleum refining, they expanded from 14% of total laboratory personnel in 1938 to 19% in 1950, and in the rubber industry during the same interval there was a decline from 26% to 20%.

Although it is possible that these changes might be due, in part, to lack of uniformity in reporting to the NRC, they nevertheless tend to support the premise mentioned earlier that a change in emphasis seems to have taken place from the more fundamental work being performed in the less prosperous late '30s to the more practical engineering development of the war and post-war boom eras. If this conclusion is correct, it would seem that our industries have been drawing against the reservoir of previously stored-up knowledge without at the same time replenishing, much less augmenting, such knowledge with new and more fundamental investigations.

LOCATION

Research laboratories are generally established in the centers of the industries which they serve. Thus, highly industrial areas are natural sites for a large proportion of the researchers working on industrial problems.

But as time goes on, some older industries tend to migrate from one region to another, and industries spring up in new areas, e.g., the Southwest and West.

This is clearly illustrated in the enlargement of research staffs in these regions. California and Texas, the two principal states in the West and Southwest, have experienced a tremendous growth in laboratory personnel. In the interval between 1938 and 1950, the number of people engaged in research in California rose from about 1,500 to 10,500, representing an average annual growth of more than 50%. Texas showed even greater progress. The number of researchers working in various laboratories located in Texas multiplied tenfold between 1938 and 1950, increasing from about 500 to nearly 5,000. In size of research staffs, California ranked seventh and Texas ninth, among all states in the union.

Most in Six States: Despite these substantial regional successes, researchers tend to remain highly concentrated in the industrial East and Midwest. Of all people employed in laboratories in 1950, 62% were located in three Eastern states (New York, New Jersey, and Pennsylvania) and three Middle Western states (Ohio, Illinois, and Michigan). But as a re-

TYPES OF RESEARCH PERSONNEL IN MANUFACTURING INDUSTRIES

PROFESSION	NO. OF PERSONS EMPLOYED	
	1940	1950
Chemists	15,700	23,159
Physicists	2,030	2,969
Engineers	14,980	35,601
Metallurgists	1,955	2,673
Other Professions	1,879	6,175
TOTAL Professional	**36,553**	**70,577**
Technical Supporting Personnel	16,400	40,809
Administrative, Clerical and Others	17,080	53,651
TOTAL Auxiliary Personnel	**33,480**	**94,455**
TOTAL Laboratory Personnel	**70,033**	**165,032**

TYPES OF RESEARCH PERSONNEL IN SELECTED INDUSTRIES

PROFESSION	CHEMICALS AND ALLIED INDUSTRIES 1938	CHEMICALS AND ALLIED INDUSTRIES 1950	PETROLEUM INDUSTRY 1938	PETROLEUM INDUSTRY 1950	RUBBER INDUSTRY 1938	RUBBER INDUSTRY 1950
Chemists	4,850	9,399	960	2,633	501	1,030
Engineers	1,094	3,474	733	3,208	593	762
Physicists	142	216	466	245	24	82
Metallurgists	66	109	15	23	–	2
Other Professions	–	1,073	–	343	–	11
Unclassified Professionals	1,870	1,361	436	125	232	4
TOTAL Professionals	8,002	15,632	2,610	6,577	1,350	1,891
Supporting Personnel	1,520	16,941	2,423	10,488	900	1,915
TOTAL Laboratory Staffs	9,542	32,573	5,033	17,065	2,250	3,806

sult of more rapid growth of other regions, in 1950 this concentration was somewhat less pronounced as compared with 1938, when over 73% of total personnel was located in those six states.

An even more significant feature of the geographical distribution of industrial research, according to NRC's latest report, is that in 1950 "more than 80% of all laboratories and over 90% of research workers were located in or near large cities. Approximately 35% of all researchers were found in the metropolitan areas of New York, Chicago, and Philadelphia."

Still another important aspect of this concentration is the proportion of research workers employed by large corporations. According to reported personnel in 1950, 45 of the largest corporations employed over a third of the total workers engaged in industrial research, as compared to the 2,750 corporations employing the other two-thirds; and perhaps over 200,000 manufacturing concerns do not maintain any organized research at all.

But there has been a tendency away from concentration in large enterprises. In 1938 the same forty-five corporations employed nearly half of the total research staffs listed in that year.

When the locations of individual professions are analyzed, it is found that the largest number of research chemists are employed in New Jersey, with New York, Pennsylvania, and Ohio following. Nearly half of all chemists engaged in research work in these four states.

A similar situation prevails with respect to research engineers. This profession is highly centralized in New York State, with New Jersey, Pennsylvania, and California following in order. Almost 50% of all research engineers work in those four states.

EXPENDITURES

The amounts of money spent for research, and the changes in such expenditures during a given period, would provide another index of growth. Unfortunately, only a very few of the largest corporations keep separate research budgets, and therefore accurate figures are not available.

Moreover, the cost of research per worker varies widely between individual industries, and perhaps even more between individual companies in the same field. It depends not only on the kind of scientists employed and the type of projects worked upon, but, more importantly, upon the type of equipment used.

In the absence of precise figures on expenditures, it is still possible to arrive at reasonable estimates by assuming an average cost per researcher. Including salaries, equipment, and materials, the most recent estimates place the annual cost per laboratory worker at about $7,000. Some authorities claim that such costs per scientist comes to $12,000 per year, but since each scientist needs at least one assistant, both estimates boil down to nearly the same amount.

On the basis of the man-year expenditure of $7,000, it is estimated that all manufacturing industries combined, with research staffs of over 165,000 people, spent about $1.15 billion in 1950. Based on a $4,000 cost per man-year, such expenditures in 1940 amounted to $280 million. In each case most government and all university expenses for research are excluded. Since the purchasing power of the 1950 dollar was about 50% less than in 1940, the total amount of effort spent for research between these two periods just about doubled.

Military Money: Government-supported research, on the other hand, increased by more than twenty times for the same period. And between 1945 and 1950 annual military expenditures for research, exclusive of the atomic energy program (part of which is included in the industry estimate) ran to about $550 million, as compared to only $22 million in 1940.

The tremendous growth of military research during the last decade is partly responsible for the relative decline in certain categories of professional scientists. Chemists, physicists and others have apparently shifted from industrial laboratories into military research at a faster rate than they were replaced by new graduates.

Without attempting to minimize the

LOCATION OF RESEARCH PERSONNEL

STATE	NO. OF PERSONS ENGAGED IN RESEARCH 1927	1938	1950
California	500	1,497	10,573
Delaware	730	1,613	3,154
Illinois	1,810	4,527	12,025
Indiana	401	1,282	6,933
Massachusetts	618	2,028	6,033
Michigan	954	2,993	11,655
New Jersey	1,787	6,057	22,249
New York	6,508	7,514	28,716
Ohio	2,100	4,763	12,657
Pennsylvania	1,426	4,685	15,699
TOTAL Above States	16,834	36,950	129,693
TOTAL All States	18,982	42,271	165,032

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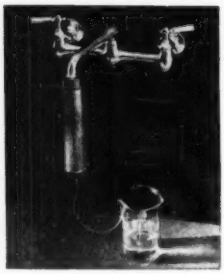

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importance of military research, which will cost over $1 billion in 1951, this shift in emphasis means fewer new products and services for consumers.

Although certain important innovations will come out of the military research effort which will eventually benefit civilian industries, the recent slow-down in the rate of discovering and amassing new knowledge may have important consequences for the future. Many of the chemical products commercialized in the '40s were based on research data gathered in the previous decade; thus development engineers of tomorrow will have no "easy pickings."

To offset this apparent deterioration in the position of science in our society in the face of continuing expansion of military research, it would seem wise to expand university training programs and speed up the tempo for developing new researchers.

Faster than Sales: According to the assumed yardstick of $7,000 per researcher worker annually, the chemical and allied products industries alone spent in 1950 about $228 million—more than was spent by all manufacturing industries in any year of the '20s and more than four times as much as was spent in 1940.

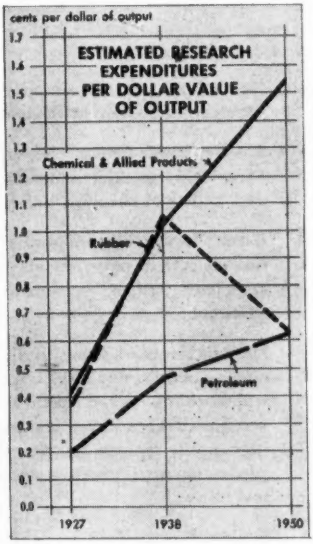
Expenditures for petroleum research rose from about $29 million in 1940 to $119 million ten years later. In rubber, the increase was from $10 million to nearly $27 million.

As the expenditures for research are actually advance payments for future business, it is of interest to relate such expenses to the total value of goods and services produced by individual industries. On this basis, the chemical industries spent about 1.55¢ in 1950 for each dollar value of output. That the return on the investment in research has been profitable can be seen by the fact that in 1927 less than half a cent was spent, and in 1938 about 1¢, for each dollar value of the thousands of products turned out by the chemical industries.

The petroleum industry spent considerably less, but the rate of increase since 1938 in such expenditures has been about the same as in the chemical industry. The cost of research in this industry, in relation to the volume of goods produced, was 0.12% in 1927; about 0.5% in 1938; and over 0.6% in 1950.

In the rubber industry, on the other hand, there was an increase in such expenditures from 0.38% in 1927 to 1.02% in 1938, and then a decline to 0.63% in 1950. If these figures are even approximately accurate, it would appear that in the rubber industry the limit of profits from investments in research was reached in the '30s, and that by 1950 it was no longer feasible to continue at this level. It is possible, too, that rubber industry management has not been so research-minded as its counterparts in the chemical and petroleum industries.

Yardstick: The money spent for research in relation to the total value of goods produced is significant. It shows the progressiveness of individual enterprises and their faith in future growth. When taken together with an evaluation of new products and processes, patents issued, scientific papers published, and similar criteria, such



a ratio should be of considerable interest to stockholders and management alike. It indicates to some degree the soundness of their enterprises in relation to others in the same industry, and is one yardstick of future earnings and continued profits.

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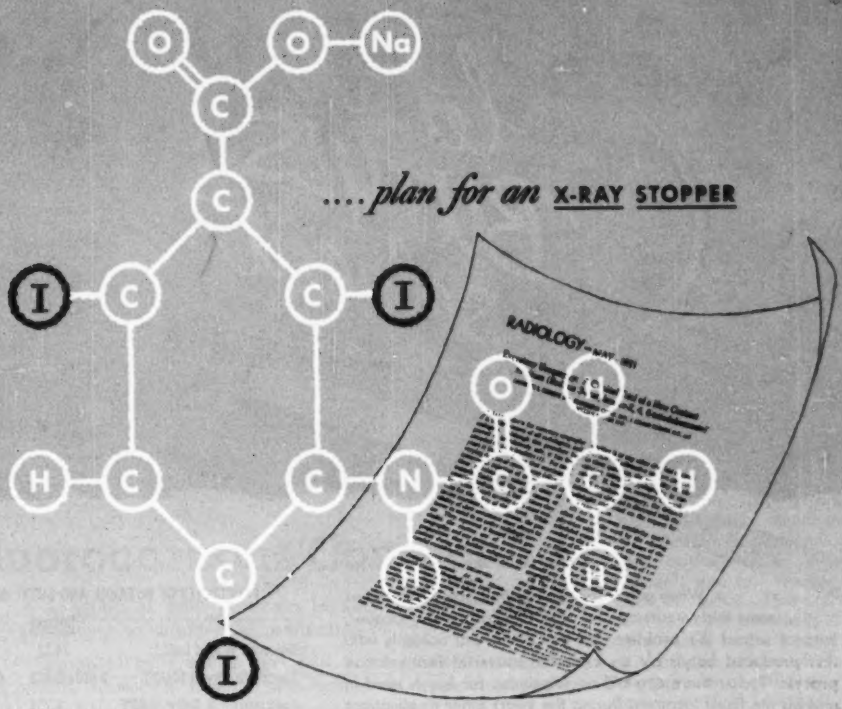

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Coefficient of Cubical Expansion, per 1°F:	0.00052	0.00067
per 1°C:	0.00093	0.00121
Boiling Point at 760 mm, °C:	117.7	126.5
Vapor Pressure at 20°C, mm:	4.3	10.1
Product-Water azeotrope, Boiling Point, 760 mm, °C:	92.7	90.5
Proportion of Product, % by weight:	57.6	72
Melting Point, °C:	-89 (approx.)	-76.8
Refractive Index, n_D at 20°C:	1.3993	1.3947
Flash Point, Tag Open Cup:	116°F	102°F
Solubility in Water at 25°C, % by vol.:	8.9	0.5
Solubility in Water in Product at 25°C, % by vol.:	17.12	1.6

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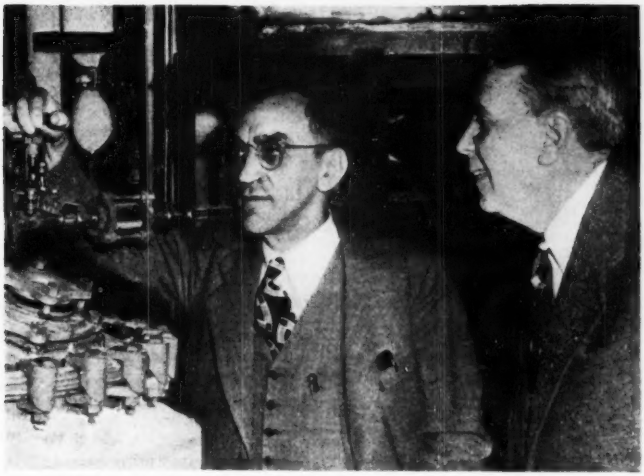

INVENTOR SIMONS AND 3M PRESIDENT CARLTON: Fluorine is out.

Fluorocarbons Come of Age

A group of new products heralds Minnesota Mining & Mfg. Co.'s swing to commercial production of fluorocarbons.

Fluorocarbons are a new and fertile field for industrial development. Research already has turned up promising applications in textiles, lubricants, plastics and fibers.

Cost is still steep, but will doubtless fall when volume production hits its stride.

Last week, Minnesota Mining & Manufacturing Co.'s fluorochemical research paid its first big dividend: commercial production of fluorocarbons. In one well-publicized—if not unexpected (*CW, March 3, 1951*)—stroke, 3M unveiled its new $250,000 Hastings (Minn.) plant and confirmed the chemical world's suspicions that fluorocarbons had arrived. Immediate plans call for semi-works production at the rate of 250 pounds a day, but 3M is looking ahead. Current output, available in ton lots for evaluation, is just a down payment on future plans.

Potentialities of the fluorocarbon family are virtually unlimited. Reasons are simple. Fluorocarbons are fluorine counterparts of hydrocarbons and conventional organics but differ sharply in their physical and chemical properties. Result is a vast, new and unique chemical horizon. Research already has pointed up promising applications in dyes, polymers, solvents, resins, pharmaceuticals, surface-active agents, lubricants, hydraulic fluids and dielectrics.

For a long time, fluorocarbons teased the imaginations of industrial chemists. They were intriguing, but commercially unattainable. Synthesis meant working with free fluorine—and that meant trouble. It wasn't until Joseph H. Simons came up with his electrochemical process that bold progress was made. Simons' process sidesteps fluorine, uses instead noncorrosive, anhydrous liquid hydrogen fluoride.

Minnesota Mining & Manufacturing picked up the electrochemical process after World War II and set up a one-cell pilot unit at St. Paul, Minn. Products from this test cell were made available for research. The results were a real eye-opener. Certain fluorocarbons were found remarkably surface-active. They retained this property in the presence of strong oxidizing and reducing agents. Applications in the dye and textile industry were apparent. Other products looked good as lubricants and hydraulic fluids; they showed better heat stability than the silicones and resisted acid formation.

A cast film, resembling cellophane, resulted from polymerizing an unsaturated perfluoro acid. Structurally related to polyvinyl acetate, the perfluoro polymer outlasted all other materials in accelerated weathering tests. Moreover, it's non-flammable and passes ultraviolet light. Photographic film looks like an ideal market. Another acid, perfluoroadipic, has been used in the production of experimental fibers.

Another highly significant aspect of the electrochemical process is the ease with which it permits preparation of fluorochemical intermediates of predetermined fluorine content. By this means it is possible to design and synthesize a host of compounds to meet specified requirements.

The first commercial products to be introduced by 3M will be of two distinct types: reactive compounds like trifluoroacetic, heptafluorobutyric, perfluorosuccinic, perfluoroadipic and other completely fluorinated acids; and relatively inert materials like perfluoro tertiary amines. When production gets into full swing, prices will likely be slashed. Many of the fluorocarbons should eventually drop to the $1 a pound range.

Although products of the 3M process are almost unlimited, there are certain practical bounds to future expansion. Power is one important example. It now looks as if a 20,000 amp. load is tops for the electrochemical cell. As a result individual cell capacity is limited. Moreover, power costs in the St. Paul area tend to impose a ceiling on the number of cells in operation at about a dozen. Any expansion over this figure will call for a new source of cheap power.

More Nylon Know-How

More durable plastics is the ultimate goal of a research program now under way at the National Bureau of Standards. One phase of the broad study, dealing with nylon-type polyamides, has just been completed. The results hint at several interesting new angles of approach to one of the most urgent problems of the plastics industry.

Deterioration of plastics is not virgin research territory. Its been investigated before, mainly by means of accelerated breakdown tests involving measurable changes of specific physical properties. But NBS points out that studies of this type are purely empirical, do not reveal basic changes in the plastic, cannot be used to predict behavior in actual service.

Bureau researchers are aiming at the heart of the matter with a basic study designed to shed light on the mechanism of plastic deterioration. Their efforts with polyamides reveal three different types of chemical change in the degradation of nylon: First, the polymer may break at the C-N bond of the peptide linkage, with the evolution of carbon dioxide, carbon monoxide, hydrocarbons and water, creating smaller polymer molecules of the same structure. Second, changes in molecular orientation or crystallinity may occur as a result of variations in hydrogen bridging, hydrocarbon packing, dipole rearrangement and other forms of secondary bonding. Third, the amount of bound plasticizing substances like water and ethanol may change. All of these internal alterations modify the physical properties of the plastic.

Slow Burn: The polyamides probed by NBS were copolymers of nylon salts with ε-caprolactam. Very thin films were exposed to heat, ultraviolet light and various atmospheres. Accelerated weathering and outdoor exposure tests also were performed. Although analysis was chiefly for structural changes, some physical properties were also determined on specimens in different stages of deterioration.

Aside from purely theoretical considerations, the NBS study should be of great value in showing the way to longer service life for plastic materials. In the case of nylon, it appears this can be accomplished by additives or coatings that absorb ultraviolet radiation. In addition care should be taken to prevent the loss of water and organic liquids from the polymer.

The detrimental effects of changes in crystallinity and orientation might be overcome by chemical modification of the polymer (i.e. alkyl-N-substitution). It appears, however, that as long as the carbonyl function is present in the peptide group, a definite focal point of attack exists. But this weak spot might also be bolstered by proper manipulation of substituents.

While the results of the polyamide study apply primarily to thin films, NBS believes they should provide a valuable basis for future studies of the deterioration of other types of nylon in textiles, brushes, hosiery and tires.

•

Metals Lab: A new two-story central research laboratory is being erected for American Smelting & Refining Co. at S. Plainfield, N. J. The 82,000 sq. ft. building will house 72 individual labs and continue the firm's basic studies on gold, silver, lead, copper, zinc and other metals produced by the company. A laboratory with about half the space of the new unit is now being operated at Barber, N. J.

TESTING NYLON FILM: The peptide linkage is weakest.

•

Rubber Chemicals: Monsanto Chemical Co. is building a laboratory to house about 90 workers at Nitro, W. Va. Most of the work in the new laboratory will be directed towards the development of rubber chemicals.

•

Kraft Paper: The Southern Kraft Div. of International Paper Co. is constructing a new research building at Mobile, Ala. Object: To find new and varied uses for southern pine and by-products of the manufacture of kraft paper.

•

Textile Preserver: Copper 3-phenylsalicylate, a new preservative for textiles, is now in the pilot-plant stage at Dow Chemical Co. The compound gives effective protection against bacterial attack, presents no problem to the textile processor. It's applied by the standard two-bath technique from an aqueous dispersion or an organic solution. Finished fabric is virtually odorless.

•

Tough Females: Esso Standard Oil Co. researchers have come up with some pretty substantial evidence to prove that female insects are a lot tougher than males. While testing an experimental insecticide, workers noted that only about half of the test bugs were affected—the male half. Ninety per cent of the females thrived on the would-be insect-killer.

•

Fluorine Analysis: German analysts report an effective, new micro-determination of fluorine. Test substance is distilled with perchloric acid and silica; fluosilicic acid formed is then titrated with thorium nitrate, using alizarinsulfonic acid as indicator.

•

Ceramic Research: Ryan Aeronautical Co., San Diego, Cal., has just established an agency to control and coordinate ceramic coating development. An important phase of the agency's work is the coordination of experiments with titanium as an aircraft construction material.

•

Atropine Stand-In: Tigloidine, an alkaloidal substance investigated by workers at the Australian University of Melbourne, may prove to be a practical substitute for atropine. The compound lacks many of atropine's distressing side-effects, but is less active per unit weight.

•

Antioxidant News: Dow Chemical Co. will shortly make Styphen I, a new rubber antioxidant, commercially available. A mixture of styrenated phenols, the product is effective with GR-S and natural rubbers. Dow says the product possesses outstanding nonstaining properties and should be useful for protecting items like white side-wall tires, refrigerator gaskets, etc.

•

New Estrogen: Researchers of the Mexican firm, Syntex S.A., have synthesized 17-ethylenehemithioketal, an estrogen lacking many of the undesirable side-effects of estrone. Biochemical evaluation is now under way.

•

Fungicides Probed: Evaluation of 100 different fungicides in varnish and lacquer vehicles has just been completed by the Naval Research Laboratories. Fungus-inhibiting properties were determined, at three concentrations, by actual exposure in the jungles of Panama. Most test agents, including many popular chlorinated phenols, were ineffective.

The following ten compounds showed up best: *o*-hydroxyphenylmercuric chloride, salicylanilide, pyridylmercuric chloride, *p*-toluenesulfonylamide, uranyl nitrate, *p*-aminophenylmercuric acetate, phenylmercuric *o*-benzoic sulfimide, *p*-acetylaminophenylmercuric acetate, hydroxymercurisalicylic acid anhydride, phenylmercuric phthalate.

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which are being used in a variety of products and processes

A partial list of other Oronite Chemicals

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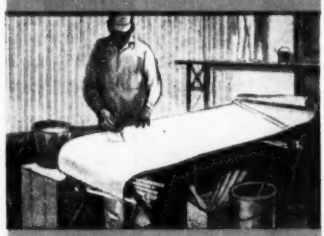

In adhesive compounds such as wallpaper paste.

In metal cleaning and de-greasing preparation.

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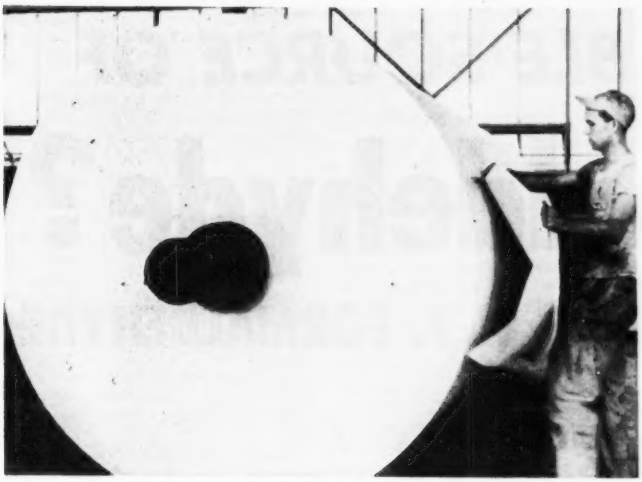

HARDWOOD PULP: International Paper led the way—world is catching up.

Now—Hardwood Pulp

The growing trend toward production of dissolving pulp from long-neglected hardwoods is world-wide.

Critical forest problem—rapidly increasing hardwood percentage of stands—gives impetus to new process.

Pre-hydrolyzed sulfate is the process leading the way in this major pulping development.

Recent developments from Spain, Australia and the United States have thrown sharp light on a world-wide movement toward the use of hardwoods in the production of dissolving pulp for rayon. Pushed by economic necessity growing from the rapidly increasing percentage of hardwoods in local forests, pulp manufacturers are being forced to find ways to use these hardwoods.

In Spain the fledgling rayon industry is seriously considering the use of plentiful local eucalyptus trees for dissolving pulp, and in Australia, the Australian Paper Manufacturers, Ltd., is ready to begin construction of a plant to produce dissolving pulp from these same eucalyptus hardwoods. It has its process ready to go, and has already produced rayon from the pulp.

In the United States, Buckeye Cellulose Co.'s projected plant, to be built under a 65% write-off (probably at Boyd, Fla.) will use a process that can work for making dissolving pulp from either hard or softwoods. This will be the second major plant to use such a process. The first, International Paper Co.'s Natchez plant, has been in operation since mid-1950, turning out dissolving pulp from hardwoods at a rate of 100,000 tons a year.

Search Grows Hotter: On top of these major commercial developments, researchers in the wood and pulp field are spending more and more time investigating bigger and better ways to utilize hardwoods. Much of this work is already in the pilot plant, and additional commercial installations seem just around the corner.

Extensive experiments on the use of hardwoods for acetate and viscose are being conducted in the pilot plant of W. Va. Pulp & Paper Co., and have been for some time. At the University of Florida the pulp and paper laboratory is working on its pilot plant for continuous production of dissolving pulp from scrub oak and other hardwoods (*CW, Sept. 29*). In Wisconsin, the Forest Products Laboratory is also looking into the problem.

Sulfate Leads the Way: Despite the geographic diversity, and the number of companies and institutes involved, almost all work seems to be centering around a modified sulfate process, i.e. pre-hydrolyzed sulfate process followed by multi-stage bleaching.

Up to now almost all dissolving pulp was produced by the sulfite process, largely because it was the simplest way to remove the pentosans. But the sulfite process is not practical for use on hardwoods—it was tried in Australia on eucalyptus and proved unsuccessful. On the other hand, the sulfate process in general use was not effective enough on the pentosans, and was difficult to use for viscose due to the presence of wood polyoses.

The answer now appears to be pre-hydrolysis, which removes the pentosans and polyoses, followed by the sulfate treatment, and multi-stage bleaching. This is the process in use by International Paper, scheduled for the new Buckeye plant, ready to go in Australia, and being used at the University of Florida.

Effective and Versatile: The process is effective and versatile. It can be used on both hardwoods and softwoods, giving a flexibility for any future raw material developments. It can even be used on straw, and other potential sources of pulp that may be needed some day.

In addition, recovery of chemicals is easier with the sulfate process, and the cook tends to be shorter. Since it is an alkaline process, resins, waxes, or fats in the wood do not hinder its pulping action. And, as the work at the University of Florida shows, it is readily adaptable to continuous operation.

Necessity is the Mother . . .: The process is by no means a new one. It has been known for some time, but until recently the industry didn't have the impetus to iron out its wrinkles and resort to its use. But with the cut of softwoods exceeding growth, and with an accelerating trend toward

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natural replacement of softwoods by hardwoods, the handwriting on the wall is clear. Hardwoods are going to be used.

The need for more and more rayon became apparent when it was found to be the best fiber for tire cord. In 1939 only 9 million lbs. of rayon went into tires, but by 1949 that figure had jumped to 282 million lbs. It is estimated that over 80% of all tire yarn will be rayon very soon—and the pre-hydrolyzed sulfate process is particularly good for producing cord rayon.

In many parts of the world hardwoods form the bulk of the forest growth, and in other places, certain hardwoods, such as eucalyptus, are of great advantage if they can be used. In the United States many forest areas are becoming predominantly hardwood growths (in the South, over 50%).

Softwoods have been cut so extensively that the hardwoods are now closer to the mills, cheaper, and far more plentiful. This alone is enough to bring about the world-wide trend to the use of the pre-hydrolyzed sulfate process for making dissolving pulp from them.

Remote Control

The problem of "lag" in transmission of signals to determine the fluid level during a chemical process has long been a thorn in the side of chemical engineers. Now the Automatic Temperature Control Co. has come up with an electrical differential pressure transmitter that can be operated without the inherent lag of pneumatic systems, even with the control installations a long distance, as is so often necessary, from the process equipment.

The new unit is designed to be used alone or in conjunction with present air bubbler systems at the process site. When used with air bubblers the unit reduces lag to that occurring in the process equipment itself.

Up to now electrical remote control has been difficult because a power source is often unavailable at the location of the process. But the new unit overcomes this by making use of a relay at the plant which supplies the power to the transmitter at a distance.

Chemical Boon: Intended specifically for wide application in the chemical process industries, the unit, while it will measure any fluid level differential, is particularly applicable to the measurement of catalyst level in storage tanks, transfer bins, and withdrawal drums.

Designed for use with explosive hyrocarbons, the electrical unit has been made explosion-proof by being fitted into a standard explosion-proof conduit fitting.

Craftsman's Demise

Electronic control has moved in on another "art", application of vat dyestuffs to fabrics. Previously this operation was dependent on the experience and know-how of the operator for its control. Today exact controls are provided by the newly-developed Marhen dyeing process, a joint invention of D. E. Marnon and J. H. Hennessey of the research staff of General Dyestuff Corp. (GDC).

Application of vat dyestuffs to cloth is carried out in an alkaline bath that contains sodium hydrosulfite as the reducing medium. Faulty dyeings, usually the result of an improper balance of chemicals in the dye bath, are nearly eliminated by the new device. Electronic mechanisms measure the reduction potential and this measurement is the means of controlling the chemical content of the bath, at the proper temperature..

Other outgrowths of the use of the new dyeing method, according to GDC technical director, J. Robert Bonnar:

- Achievement of the desired shade of color is assured.
- Smaller quantities of chemicals and dye perform a given operation.
- Time required is reduced.
- The percentage of acceptable dye jobs is upped.
- Oxidation stains, which are caused by insufficient sodium hydrosulfite in the bath, are nearly eliminated.

Prior to development of the Marhen process, information concerning the condition of the dye bath was provided by titrations to determine the alkalinity; and the degree of reduction was measured by reduction indicator papers. Titration is slow and the indicator papers measure only the power of the bath to reduce, not the quantity of the dye in the bath.

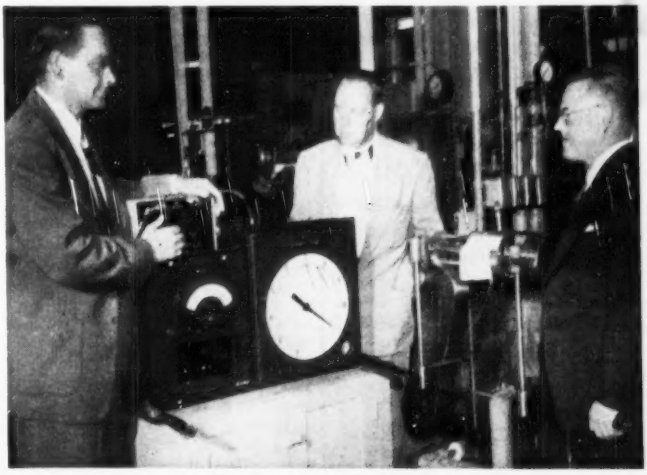
Such a process will be of great assistance to the dyestuff user in his constant battle to stretch the supply of costly colorant—part of the eternal battle against increasing costs.

EQUIPMENT . . . .

Submersible Pump: Kenco, Inc. is now producing a submersible sump pump for applications in the process industries. The submersible feature is made possible by a patented switch which eliminates the need for a float. The switch operates by air pressure caused by water rising in the switch skirt. As the water rises, the resulting air pressure moves a diaphragm which trips the switch. Kenco says the new pump should prove useful because of its portability (weighs 50 lbs., stands 9½ in. high, is 13 in. in diameter at its widest part) and high capacity (55 gpm).

•

Solids Heat Exchanger: A new heat exchanger, Holo-Flite, is being pushed by Western Precipitation Corp. It consists of two or more intermeshing conveyor screws that rotate in a trough. As the material moves up the trough by the action of the screws,



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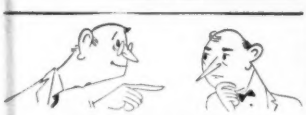

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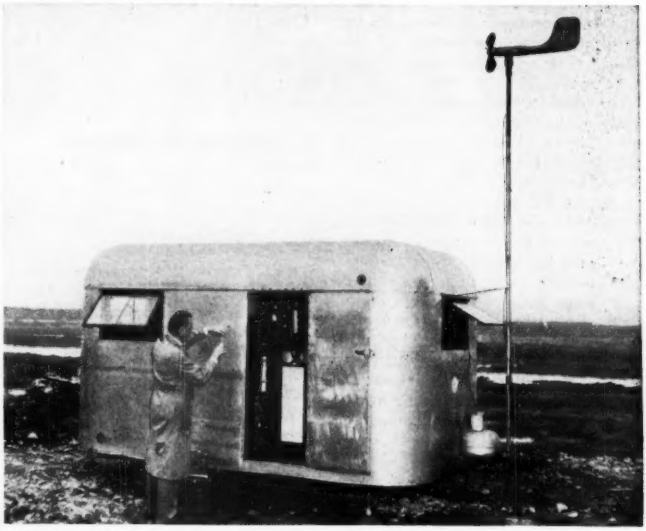

Mobile Lab Joins War on Smog

While the foghorns blow at noon, officials wrangle, and industry worries over the growing protest against the pall of smoke covering metropolitan New York and New Jersey—a new mobile laboratory of the N.J. Department of Health is chipping in with a little science. In a converted car trailer, the Department's Bureau of Industrial Hygiene has built a complete air-pollution laboratory. Equipped to measure smoke density, amount of foreign material in the air, temperature, humidity, wind direction, and wind velocity, the unit is a step towards the ultimate control of the highly industrialized area's smoke problem. By driving into an area, checking what type of pollution to expect, measuring it, and making its report to local authorities, the unit gives community the data to act as it sees fit.

the heating agent (or coolant) moves down through the hollow blades and shaft of the conveyor. The Holo-Flite heat exchanger is said to be suitable for fine crystals or powders, as well as slurries, pulps and pastes. Advantages claimed: It permits high rate of heat transfer through intimate contact with the heat-exchanging surface, continuous processing, and it requires less space.

•

Temperature Monitor: Brown Instrument Division (Minneapolis-Honeywell Regulator Co.) is introducing its ElectroniK scanning system capable of monitoring up to 270 separate temperature points. The system includes audible and visual alarms that indicate when the temperature goes beyond the desired limits. It scans at the rate of one point per second. Brown says the system should find use any place where continuous monitoring of many points is required. It suggests as likely users: steam generating stations, synthetic yarn producers (for feed material to spinerettes), drying towers and viscose baths.

Portable Viscosimeter: Wallace Davis & Co. claim to have made viscosity and gel strength measurement easy through its Fann V-G meter. The instrument is a cylinder concentric to a stator. The liquid to be measured occupies the annular space between the two. When the cylinder is rotated, the liquid exerts a torque on the stator proportional to the viscosity of the liquid. The torque is measured in grams, converted to centipoises. It weighs 9 lbs., can measure viscosities between 1 and 150 centipoises.

•

Sludge Feed: According to Pulva Corp., its Com-Bin feeder is the answer to problems involving the constant feed of semi-solids. It's a cylinder attached to a vertical shaft; the feed material fills the annular space between the two. A flat plate on the bottom permits a space between the plate and the cylinder. As the cylinder and plate rotate, a stationary blade removes the material from the space, directs it into a bin. Feed rate can be altered by adjusting the blade or speed of rotation.

Waxing With Shellac

Floor polishes with high shellac content are making inroads into sales of wax emulsion products. Main selling points are high gloss and hard film.

Beacon Wax has pushed its Quik-Gloss into dominant position in some Eastern markets. But S. C. Johnson is countering with a new product, Hard Gloss Glo-Coat—and other wax makers may follow this leader.

Housewives in an increasing number of Northeastern cities this week are being confronted with a new green band can as they reach for their favorite brand of self-polishing no-rub floor polish. It is Hard Gloss Glo-Coat (*CW Newsletter, Oct. 13*), product of wax leader S. C. Johnson & Son.

And what won't interest housewives particularly, but what is intriguing the wax products industry is that there is no reference to the new polish as a wax. Yet Johnson has long been identified as Mr. Wax.*

Johnson—true to practice of specialties, and particularly wax specialties, makers—is loathe to discuss the content of its product other than to say it does contain wax; in fact would rather not have the product discussed at all except by users and potential users. The industry, however, has its eyes glued on the sales leader it may have to follow tomorrow; reasons that Hard Gloss contains a goodly amount of shellac in addition to wax, was introduced as a result of the success of at least one similar product.

Boston Beginnings: The product that has won a strong position in a large portion of the Eastern market, and may as some believe, have demonstrated to Johnson the sales potential of a high-gloss floor wax, is Beacon Quik-Gloss Wax, made by Beacon Wax Co., Boston. Beacon is no more communicative than Johnson about its material. The betting among competitors, however, is that a dry film of Quik-Gloss contains more than 50% shellac. This gives it the high gloss that has been its strongest selling point.

Some idea of how well Beacon has moved in on the competition with Quik-Gloss (the company claims that in some areas it outsells its nearest rival two to one) may be gained from the New York Market Merchandise Inventory Monthly Move-

FLOOR POLISH: Some changes made.

ment Report compiled by the *New York World-Telegram and Sun*. This covers 200 selected grocery stores spotted in 14 counties within a 50-mile radius of Columbus Circle, in New York City.

Beacon, which previously had not been sold through groceries there, did not appear on the report until March and April of this year. Its 1-pt. size popped up with 49.5% distribution in the 200 outlets, as against Johnson's Glo-Coat's (same size) 68%. But an average of 18 units of Beacon Wax were sold per store; only 12.1 units of Glo-Coat were sold on the average in each store. Thus Beacon took the No. 1 spot* away from established-leader Johnson which the two previous months had led in average sales of pints per store with 14.5 against 8.0 for Boyle-Midway's Aerowax. And the Beacon-Johnson relative positions have continued the same to date.

Matter of Definition: Beacon, unlike Johnson with Hard Gloss, calls its product a wax. Hard-Gloss, however, is debuting at a time when Fair Trade Practices for the Wax and Floor Polishes Industry are being considered by the Federal Trade Commission; and included in tentative rules is a ban on calling a product a wax unless it deposits a film containing at least 50% wax. At FTC hearings on the proposed rules, Beacon, which has had its product on the market for a number of years, took, along with others, the position that shellac in wax film should be considered as part of the wax content.

Since there are many different opinions on just how a wax should be defined, the matter remains to be clarified. It may be that Johnson did not want to take a chance on having to rename its product at a later date; calculated that Glo-Coat means "wax" to millions of consumers.

Never So Much: Shellac in self-polishing water emulsion waxes is nothing new. It has been used for years to aid the leveling properties of the polish, give a quick luster and increase slip-resistance. The remainder of the coating deposited on the floor has been wax—principally carnauba, especially in quality products, blended with other waxes and resins.

The percent of shellac in the solid portion of the formula has been low—often about 10% seldom above 20%. And as shellac became more expensive over the years, manufacturers in the highly competitive wax business kept its use to a minimum.

Today the situation is changed somewhat. The prized carnauba is in the $1.20-a-pound range but shellac sells for about 70¢. While there are less expensive waxes than carnauba, many formulators think there are few materials much cheaper than shellac that will give a film with as good adhesion, wear and gloss. This price differential undoubtedly has influenced the trend toward replacing more of the wax with shellac. Yet both Beacon's Quik-Gloss and Johnson's Hard Gloss are $1.10 a quart, higher than Glo-Coat at 98¢.

There are of course a number of less well-known brands boasting (or concealing) 75-85% shellac in the finish they impart to a floor. This is true not only in this country, but also in Canada (where Johnson broke Hard Gloss). Hard Gloss Glo-Coat, however, will probably be the first big national product of this kind although it may have company soon. For wax makers like to play follow-the-leader.

* Actually Glo-Coat, Johnson's established product in the red band can, was not identified as containing wax for years, but now is.

* Combined sales of pints and quarts give Beacon an 38.4-to-20.1 edge over Johnson.

The Sink–And More

The phrase "everything but the kitchen sink" has to be twisted to "the kitchen sink and everything else" in talking about Agava, a West Indian vegetable extract imported by Claude Spray. It started out as a sink unstopper, is now going on to everything else.

Spray* has marketed Agava for about 18 months, and up to now, sales have increased at a promising though unspectacular rate. A black liquid, it is a by-product of rope manufacture, is shipped to the U.S. from the Caribbean area.

Agava first attracted attention because of its grease-dissolving properties. When used as a drain cleaner, it has the advantage of non-causticity over usual cleaners which contain caustic soda.

From this use, excursions into detergents and water treatment materials were naturals. Application as a rust remover in auto radiators, as a cleaner for Plexiglas and as a silver polishing agent came soon after.

Sales at retail by such stores as New York's Macy's and purchases industrially by such firms as the Union News Co. were taking an increased volume. But then, Spray started making new discoveries.

Use As Medicament: One of the ingredients he found in Agava was cortisone. In fact, he reports that it has been considered as a source of that material. But then came a new discovery–its action, so it seems, is like cortisone's, "only more so."

Among the uses he enthusiastically reports: elimination of athlete's foot and Pacific fungus infections, killing of poison ivy plants in 24 hours time, aiding alleviation of arthritic suffering when applied topically, regulation of plant growth (as a hormone), relieving psoriasis and dissolving gallstones.

Present label specifies no medical uses, however. Undoubtedly, before such labeling is approved, the FDA will take a long and careful look at the various claims.

Spray has a factory at Haverside in Jersey City, where the concentrated extract is received from the Indies and is packaged for industrial and retail use. He estimates value of monthly production has varied between $50,000 and $100,000.

For home use–as a drain cleaner-detergent, not as a nostrum–the product is packed in 8-oz. cans selling for 79¢ and 6-oz. bottles (at a higher dilution) for 49¢. Industrial sales price per gallon is $8.50.

*An employee of the New York Life Insurance Co., Spray has worked with Agava only as a sideline.

COTTON FARMER: More gamma in his BHC.

Trend Is Up

Gamma content of benzene hexachloride–the active isomer in the insecticide–is going up. The bulk of BHC produced is still the 12-15% gamma grade, but from now on you can look for more higher gamma products: 36-45%; 60%; 80%; and lindane (essentially 100% gamma BHC).

The reasons for the swing toward high-gamma BHC are clear: Isomers other than the gamma obtained in chlorinating benzene have negligible insecticidal value. If they are applied to crops in formulations made from a technical product containing only 12-15% active ingredient, good benzene and chlorine that might be extracted from the chlorination product for useful purposes are literally being dumped on the ground.

Also these other isomers are somewhat damaging to plants and are responsible for off-flavors imparted to crops grown on soil which has received more than recommended applications of BHC. Although 12-15% has been–and is being–used successfully and safely on cotton and other crops, higher gamma materials reduce the possibilities of residue build-up in soil. For less of the material has to be applied per acre, and in that applied, there is less of the unwanted isomers.

Added advantages are savings in freight–there is a constant demand for higher and higher gamma BHC for export–and containers.

Everybody's Doing It: The 12-15% gamma BHC is still the product being manufactured in greatest quantity.

But the number of companies raising the gamma content is growing. Stauffer Chemical has always put out a 24% material, but this season it started making a 40% product. It is expanding that, and may go even higher.

Kolker Chemical produces only the 36%, as does Pennsylvania Salt Manufacturing. And Pittsburgh Agricultural Chemical is putting out a 36-45% material in addition to the low-gamma.

Some companies have their sights even higher than that. Ethyl Corp., which produces the normal product, is also making an 80% material as well as small quantities of lindane, the essentially pure gamma isomer. Montrose Chemical, also making the 12%, has added a 36-40% product and may not stop there. It is in the lindane picture, too, as is Commercial Solvents, another 12-15% gamma maker. Tennessee Products, now making only the low-gamma, has plans to go to a 60-65% product, possibly by next spring.

Hooker Electrochemical, the only sizable producer of lindane, produces a variety of materials, all of which are sold by California Spray-Chemical. Cal-Spray has marketed 60% and 80% materials in addition to the low-gamma and lindane, is particularly enthusiastic about the potential of the high-gamma materials.

•

Grace Ag Chems: A new agricultural chemicals division for processing and distribution, with an accent on organic insecticides, has been formed in San Francisco by W. R. Grace & Co. The new division, which will process and sell on a national scale under its own label and those of private concerns, is headed by Charles F. Lunsford, formerly with Pittsburgh Coke and Chemical Co.

Well-known in the field of international transportation, W. R. Grace has long been in the agricultural chemical field through its subsidiary Naco Fertilizer Co., from which the new division will be quite separate. Plans are under way for the new division to set up several locations in the country for formulating and warehousing.

•

Johnson Plant in P.I. The Philippine Islands Government has issued a license for S. C. Johnson & Son to ship bases for the company's wax products to Manila and process them there into finished goods. The plant, to be in operation within a few months, is expected to enable the company to regain a large share of the Philippine market denied it when restrictions on the importation of many finished articles, including wax, went into effect.

•

O-Cel-O Expansion: O-Cel-O, Inc., Buffalo, N.Y., manufacturer of cel-

lulose sponges, has completed a $130,000 expansion of its plant at Tonawanda, N.Y. The six-year-old company's sales are currently $3-4 million a year, nearly double those of a year ago.

•

Mixing Plant: Charles H. Lilly Co. has established a branch plant in Tacoma, Wash., to mix such diverse products as fertilizers, calf meal, and a poison bait for strawberry-root weevil. Capacity will be 30 tons an hour.

•

Warp Sizes: Zimmerman Associates, Guilford College, N.C., has developed two new sizes for cotton warp yarns: Glyozole (pat. pending, trade mark registered), a 100% active liquid which serves primarily as a starch plasticizer; and Glyotal, a 100% active solid which serves as a softener for the starch size. Both are used in conjunction with starch, may be used with or without a starch homogenizer.

•

Price Reduction: Du Pont has reduced prices on its Marlate methoxychlor insecticides and EPN-300, its organic phosphorus compound suitable as a miticide and insecticide, about 11½% on basis of carlot deliveries. The new prices vary with formulations and package sizes.

•

Company Purchase: Warner-Hudnut, Inc., New York pharmaceutical and cosmetic firm, will acquire Maltine Co., Morris Plains, N..J; manufacturer of pharmaceutical and biological products for the ethical drug field. Ownership transfer will be accomplished by Warner-Hudnut's offering an exchange of two shares of its common stock for each of the 146,000-odd outstanding shares of Maltine common stock. No change in Maltine's corporate form, internal organization or customer and employee relations is contemplated.

•

Pre-Lathered: Distribution of Dyna-Shave, aerosol shaving cream made by Dyna-Shave, Inc. (Chicago) is now being shifted to barber shop channels. The product has been sold by mail order since its introduction early this year, but jobbers and barber shops in over 24 states now handle the product, and complete national distribution is a year-end target.

Such distribution, said to have chalked up $7½ million annual sales for another company using these channels exclusively, has definite advantages. The barber can't stock as many varieties as outlets like drug and department stores; hence there is less competition for a product. And the barber is his own demonstrator; he's willing to shave customers to make the sale—and the profit from the auxiliary service.

Dyna-Shave, packaged in a 10-oz. can, retails at $1. A study of reorders indicates that it will last about 6 months (180 shaves).

•

New Location: Tuvache, Inc., maker of perfumes, formerly located in Barrington, R.I., has opened new laboratories and a factory in Swansea, Mass.

•

Mill Mates: Two chemical specialty firms – Double-B Products Co. and Albi Manufacturing Co., both of Hartford, Conn., have moved into the Daniels Mill, the smallest of the Hockanum Mills in Rockville, Conn.

•

Bottle-Washing Compound: An additive-type compound to increase the cleaning action of bottle-washing solutions has been developed by Diamond Alkali Co. Called Sequet, it is a combination of water-sequestering chemicals and synthetic wetting agents that is said to reduce cost of bottle-washing operations in dairies, milk plants, breweries, etc.

The amount used depends upon the hardness of the water, generally a maximum of 1% being added for each grain of hardness, but quite often as little as one-half of 1% being sufficient. It is packed in 300-lb. and 125-lb. containers.

•

Clorox Sales: Clorox Chemical Co. (*CW, July 21*) has recorded net sales of $23,826,000 for the year just concluded. It has just one product, the liquid household bleach and disinfectant Clorox, but made a profit of almost $2 million in the fiscal year ended June 30. A current expansion program establishing more plants at market centers is enabling the company to avoid costly freight charges and improve distribution. More units are expected to be added when the tenth (Kansas City, Mo.) and eleventh (Charlotte, N.C.), now under construction, are completed.

•

New Company: Atlantic Chemical Corp., Hendersonville, N.C., has been organized with capital stock of $100,000 to deal in drugs, chemicals, soaps, etc.

•

Stein, Hall Plant: Stein, Hall & Co., Inc., has opened a new plant for industrial adhesives in a three-story building it recently purchased in Chicago. It comprises 19,000 sq. ft., has new production equipment and a large laboratory, will make the company's entire line.

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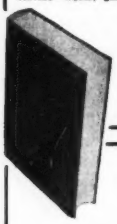

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BOOKS . . . . . .

Textbook of Electrochemistry, Volume I, by G. Kortum and J. O'M. Bockris, Elsevier Press, Inc., New York, N.Y.; xvi+351 pp., $7.

A translation and revision of the German text, this volume restricts itself to the fundamentals of modern electrochemistry rather than over-all details. Particular stress is placed on physical and thermodynamic principles in order to cover the field as comprehensively as possible. Since electrochemistry is gaining new importance in all sciences from pure physics to organic chemistry, this text points to the use of electrochemical methods as a research tool as well as to its role in the chemistry of ions. Recent advances have been noted and the bibliographies appearing at the end of the various sections have been extended to include work done in the English language.

Minerals Yearbook, 1949, Allan F. Matthews, chief editor. Bureau of Mines, Washington, D.C.; viii+1662 pp., $4.50.

This volume of the yearbook looks back on a half century of development in the minerals and metals industry. As in previous editions, this volume has been prepared in order to give information not only to those in pertinent fields, but to give the general public as well an understanding of this country's mineral position and to indicate the productive capacity of the American mining industry. The book contains general reviews of the mineral industries in 1949, a statistical summary of mineral production, and an extended list of commodity reviews. Reviews of the mineral industry, by state, are also included.

Microbial Decomposition of Cellulose, by Ralph G. H. Siu. Reinhold Publishing Co., New York, N.Y.; xi+531 pp., $10.

Placing the emphasis on cotton, the purest natural form of cellulose, the author has written an interpretive monograph on the fundamental phenomenon of microbiological degradation of cellulose. Data has been taken from military and governmental laboratories and reports compiled during and since World War II in order to present the basic facts on the decay of cellulose products by bacteria, fungi and mildew. Indicating the scientific and economic significance of his subject, the author intended to provide information which would be useful to those in diverse scientific and technological fields. Various sections review the structure of cellulose, the biochemical mechanism of its decomposition, and the methods of preventing microbiological damage.

BRIEFLY LISTED. .

Specific Methods of Analysis, a monograph dealing with newly developed methods of analysis—methods which find application wherever the measurement of organic material is a necessary research tool. Among methods covered are X-ray absorptions in chemical analysis, goniometric analysis of crystals and differential thermal analysis. One of series published by New York Academy of Sciences, 2 East 63 St., New York, N.Y. Price, $2.50.

Phase Microscopy, Principles and Applications, by A. Bennett, H. Jupnik, H. Osterberg, and O. Richards, 320-page book discussing the possibilities of the phase method, a technique making possible the microscopy of a class of materials that could not be investigated satisfactorily by means of previous methods. The theory, applications and techniques of this phase contrast procedure are presented here. John Wiley & Sons, Inc., 440 Fourth Ave., New York, N.Y., $7.50

MEETINGS. .

Natl. Paint, Varnish & Lacquer Assn., Chalfonte-Haddon Hall, Atlantic City, N.J., October 29-31.

Natl. Pest Control Assn., annual meeting, Statler Hotel, Boston, Mass., October 29-31.

Oil Trades Assn., of N.Y., annual banquet, Waldorf-Astoria Hotel, New York, October 30.

Salesmen's Assn. of the Amer. Chem. Ind., annual meeting, Roosevelt Hotel, New York, October 30.

Paint Industries Show, annual FPVPC meeting, Chalfonte-Haddon Hall, Atlantic City, N.J., November 1-3.

Cottonseed Processing Conference, Southern Regional Res. Lab., 2100 Robert E. Lee Boulevard, New Orleans, La., November 5-7.

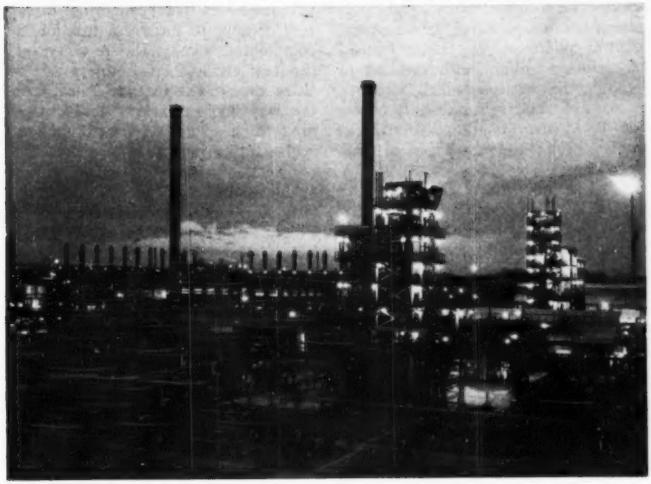
Amer. Petroleum Inst., annual meeting, Stevens Hotel & Palmer House, Chicago, Ill., November 5-8.

Amer. Fair Trade Council, annual meeting, Waldorf-Astoria Hotel, New York, N.Y., November 7-8.

Amer. Drug Mfrs. Assn., Waldorf-Astoria Hotel, New York, N.Y., November 8-9.

PICTURES IN THIS ISSUE:

Cover (top) — Chas Pfizer Co.; Cover (bottom)—Intl. Paper Co.; P. 9 (top)—Lederle Div.; p. 9 (bottom)—Pfizer; p. 12—Intl. News Photo; p. 14—Ansul Co.



ETHYL CHLORIDE MANUFACTURE: One to start and one to grow.

TEL Takes Ethyl Chloride

Shell Chemical Co. will double ethyl chloride capacity at Houston; National Petrochemical Corp. is slated to start at Tuscola, Ill.

Within eighteen months, ethyl chloride output will be increased some 25%, mostly to satisfy demand for tetraethyl lead.

More chloride boosts for ethyl cellulose will depend on firmer demand by military, wider applications by civilian industry.

During the next year and a half, the major consumers of ethyl chloride look for a supply bonanza. For instance, before the end of 1952, Shell Chemical will double the size of its ethyl chloride production at Houston, Tex. Then, in the spring of 1953, a newcomer, National Petrochemical Corp. (subsidiary of National Distillers), is slated to produce the compound at Tuscola, Ill. All the while, Dow Chemical Co., the largest producer, will be operating its Freeport, Tex., facilities at capacity.

On the basis of past performance, the added ethyl chloride for the U. S. market would readily be snapped up by the two major customers: Tetraethyl lead (TEL) for making good gasoline better, and ethyl cellulose, a tough plastic that has been just as tough to snare since going on allocation. From the time each of these products hit the market, production capacity has been straining to catch up—demand has never been satisfied. On current usage, TEL takes something over twice the amount going for ethyl cellulose. And it looks like most of the increased ethyl chloride output is slated to go for TEL, if expansion of TEL facilities is any criterion.

TEL Tale: E. I. du Pont de Nemours, Shell Chemical's biggest customer, will substantially boost output at the Deepwater, N. J., plant, using a new, continuous process. Du Pont will also be the one and only customer of National Petrochemical's ethyl chloride output.

Ethyl Corp., the other major TEL producer, is in the process of a $45 million expansion, depending, as before, on Dow Chemical's ethyl chloride from Freeport. Altogether, the demand for TEL for 1951 is estimated at around 420 million pounds, although this will likely be topped by some 25% when the expansion programs are complete.

Plastics Won't Give: Expansion for ethyl cellulose, the other major outlet for ethyl chloride, has not kept pace with the TEL boom. This may seem surprising, considering that ethyl cellulose was one of the earliest products to be preëmpted by the military. Practically none has been available for the needs of civilian industry.

But the military demand for ethyl cellulose did not materialize as expected. Today, the supply is the best in over a year. There will doubtless be a strong upturn in the civilian demand for ethyl cellulose as more becomes available to the converters, but large-volume uses are definitely limited by its relatively high cost. For example, some modified polystyrene plastics have been developed with nearly equal toughness at lower cost.

Later, Maybe More: To size up the supply outlook, the lion's portion of the ethyl chloride boom is destined for the TEL market. The long-term trend in premium gasoline requirements, military and civilian, made this expansion a foregone conclusion. But if mobilization moves ahead steadily rather than fitfully, and as converters find new applications for ethyl cellulose, the old refrain of more ethyl chloride will be heard once more.

Plus for Salt Cake

Sodium sulfate (salt cake), orphaned but still-wanted by-product of a multiplicity of chemical reactions, should be in better supply soon. Barring a sharper cut in sulfur allotments than last week's 10% reduction, users should be able to get what they need.

As a by-product, the sulfate supplies are often erratic. They may reflect general chemical activity, but not often do they accurately mirror demands for salt cake itself.

Supply and demand are thus seldom equal: When there's a buyer's market, many potential producers of salt cake come onstream, swinging the pendulum in the opposite direction. Things seldom reach a happy medium.

There are almost 40 different companies that can produce sodium sulfate. For many companies, it's a by-product from more than one plant. Du Pont, General Chemical Division, and American Viscose all have at least four such plants.

Many Sources: Salt cake is obtained in several manufacting operations:

- By-product in mining natural mineral deposits. American Potash's output at Searles Lake, near Trona, Calif., is a prime example, accounts for better than 60% of total natural output.
- By-product of hydrochloric acid manufacture in the Mannheim process (salt plus sulfuric to give hydrochloric plus cake).
- By-product of rayon manufacture. Potentialities of recovering a

99%-plus pure rayon cake are significant. Sodium sulfate is manufactured at a rate of 1.1 lb. per pound of rayon spun, but certainly not all of this is recovered.

In addition to these three, relatively small amounts are recovered in manufacture of chrome salts, phenol (from sulfonated benzene), lithium salts, boric acid and borates.

U.S. production in July included 25,651 tons of Mannheim cake, 28,262 tons natural and miscellaneous cake, 18,761 tons refined material (mainly from rayon) and 18,483 tons of the hydrated crystalline Glauber's salt.

The total, 78,113 (100%) tons, was the lowest monthly production that far in the year. Only February, with 78,876 tons approached it. High was May, with 90,599 tons. The year (ending with July) saw domestic production just under one million tons. Net imports probably added 25,000 tons.

Compared to recent years, this is an increase, but compared to 1942 and 1944, it has just held its own. In 1931, production volume was about a third of the present. It showed nominal increases in following years, but usage zoomed when World War II came along, bringing a pressing need for kraft pulp for packaging.

Where It Goes: Production of kraft pulp dominates the demand picture for salt cake. Somewhere between 70% and 80 % of the total production goes to that consumption sector.

Second biggest use once was in glass, where it aided in production of high-lime (*e.g.*, window) glass. But now synthetic detergents, with sulfate as a builder and a bulking agent, probably use as much.

Textiles come in fourth, with production in sodium alum, sodium silicate, ceramics, use in mineral stock feeds and pharmaceutical applications acounting for most of the rest.

Use Picture Changes: While the kraft industry has seen tremendous expansion, there hasn't been a proportional increase in use of salt cake. There are several reasons: First, the amount of sulfate used per ton of pulp has been cut. Improved pulp washing, use of electronic precipitators during recycling to minimize losses of powdery sulfate, improved evaporators to concentrate the pulping liquor, and last—but certainly not least—better housekeeping practices account for further reduction in sulfate use.

The U.S. Pulp Producers Assn. estimates that 194 lbs. of sulfate is needed to produce one ton of kraft. Just five years ago, an estimate of sulfate need was 241 lbs.

Another reason that sulfate usage didn't rise proportionally with kraft manufacture was development of the neutral sulfite pulping bath. Instead of reducing sulfate with sawdust to produce the necessary alkali, soda ash is dissolved and sulfur dioxide blown into it. At present, sulfur scarcity prevents more extensive use of this process.

On the plus side of the ledger, as far as salt cake employment is concerned, is the new kraft- and rayon-pulping procedure for hardwoods (*see p. 31*). Utilization of hardwoods may reverse the trend toward a decreasing percentage use of sulfate.

Use in Glass: During the recent shortage of soda ash, salt cake found increasing demand in glass manufacture. Actually, soda ash and salt cake are not interchangeable. When sulfate is used, higher temperatures must be maintained in the furnace, bringing added maintenance problems.

In detergents, demand for salt sake has increased as production of solid synthetics has gone up. Sulfate, however, is only one of several builders used.

Because of the sulfuric acid shortage, demand for salt cake has gone up in this industry. In the production of sodium alkyl sulfates, for example, manufacturers had been using an excess of acid to push the reaction to completion. Sodium sulfate was a by-product, giving manufacturers a captive source of this material. Now, with the dearth of sulfuric, manufacturers are using less acid and forgetting about such captive production.

Changes in Supply: Corresponding to the changes in the consumption pattern are several imminent changes in supply. Biggest of these will result from a trend in hydrochloric production. Before the mobilization stepped up hydrochloric needs, there was a definite trend toward acid production by burning chlorine in hydrogen and by-production from hydrocarbon chlorination.

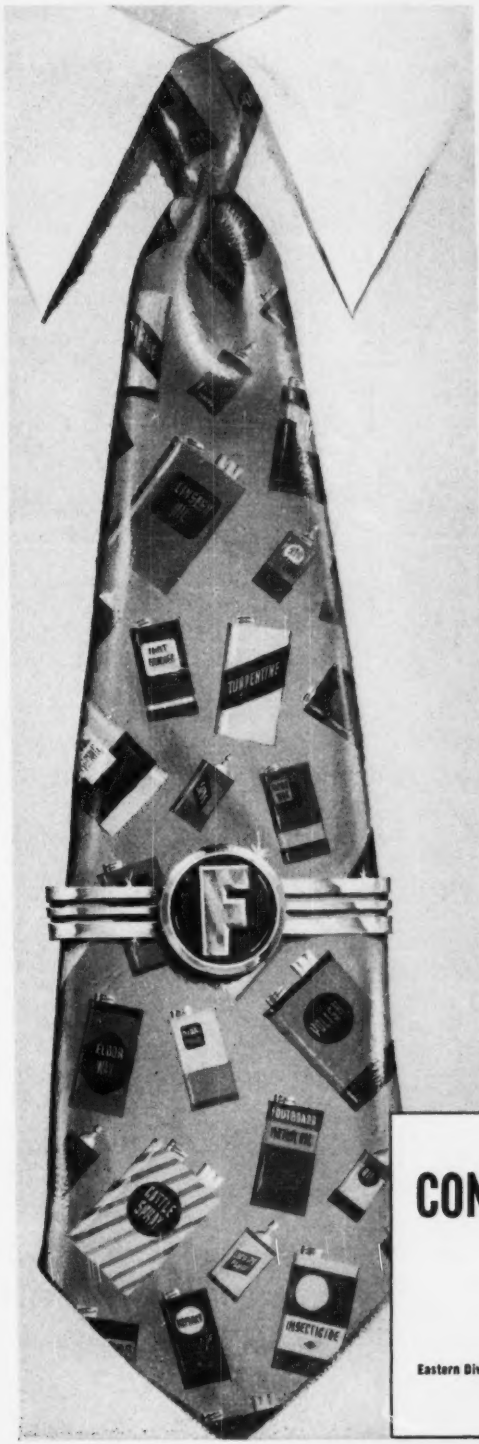
Any future letup in hydrochloric demand is sure to affect the salt-acid (Mannheim) process more than these other two. Right now, though, production from different processes hinges on relative tightness of sulfuric acid and chlorine gas.

To balance this possible loss in supply is increasing sodium sulfate recovery from rayon spinning baths. Development of new, more efficient evaporators makes greater recovery feasible.

GOVERNMENT NEEDS

General Services Administration, 50 Whitehall St., S.W., Atlanta, Ga.:

Bid Closing	Invitation No.	Quantity	Item
Oct. 29	AT-7362	200 gal	Paint, rubber base, gray, 1 gal.
Oct. 29	AT-7362	50 gal	Paint, varnish base, brown, 1 gal.
Oct. 29	AT-7362	400 gal	Paint, ready mixed, green, 5 gal.
Oct. 29	AT-7362	200 gal	Paint, rubber base, maise, 1 gal.
Oct. 29	AT-7362	100 gal	Paint, iron oxide
Oct. 29	AT-7362	800 gal	Paint, white, 1 gal.
Oct. 29	AT-7362	2,500 gal	Paint, white, 5 gal.
Oct. 29	AT-7362	100 gal	Paint, white, 1 gal.
Oct. 29	AT-7360	72 pt	Cleaner, hand
Oct. 29	AT-7360	8,400 lb	Soap, chip
Oct. 29	AT-7360	24 cs	Soap, 4 oz. cake
Oct. 29	AT-7360	500 gal	Soap, 55 gal. drum
Oct. 29	AT-7360	200 gal	Soap, 5 gal. can
Oct. 29	AT-7360	500 gal	Soap, paste
Oct. 29	AT-7360	600 lb	Soap, 100 lb. bbl.
Oct. 29	AT-7360	21 cs	Soap, 2 oz. cake
Oct. 29	AT-7360	5,400 lb	Soap, 6 oz. cake
General Services Administration, Seattle, Washington:			
Oct. 29	C-4124-1	40 qts	Pigment-in-oil paint, color chrome yellow (orange) color 7C 1 qt. cans (TT-P-381)
Oct. 29	C-4124-1	40 gls	Primer, enamel undercoater, 1 gal. container (TT-P-659)
Oct. 29	C-4124-1	1,872 lbs	Wax paste, 4 lb. cans (P-W-158)
Oct. 29	C-4124-1	450 gls	Enamel, gloss, white, in 5-gal. cans (TT-E-489)
Chief, Procurement Division, Supply Service, Veterans Administration, Washington 25, D.C.:			
Oct. 29	A-26	180 btl	Alcohol capryl
Oct. 29	A-26	520 drm	Alcohol
Oct. 29	A-26	288 btl	Ethyl chloride
Oct. 29	A-26	35,520 cn	Ether anesthesia
Oct. 29	A-26	720 cn	Ether absolute
Oct. 29	A-26	1,440	Chloroform
General Services Administration, WJW Bldg., 1375 Euclid Ave., Cleveland 15, Ohio:			
Oct. 30	CL-822-52	47,890 lb	Soap, laundry, powder, toilet, 6 items



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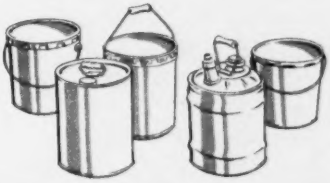

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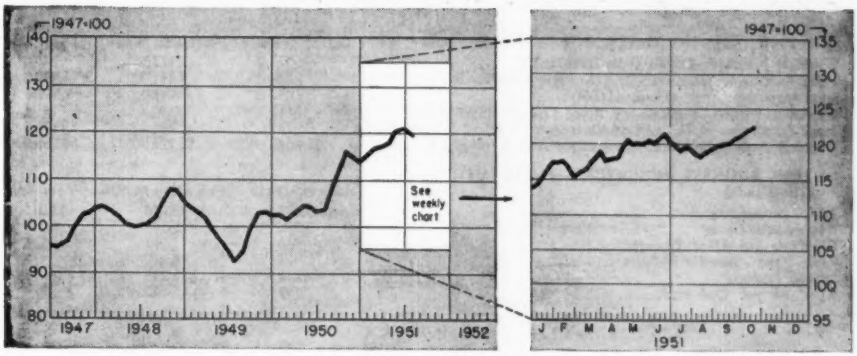

CW Index of Chemical Output—Basis: Total Man-Hours Worked in Selected Chemical Industries

Government regulations again play the predominating role for the chemical industry this week. Producers and consumers alike find new allocations and price policies that they will have to live with, somewhat to their dismay.

Most far-reaching ruling concerns the usage of sulfuric acid, affecting a host of industries from refining to fertilizers. Domestic users in the fourth quarter of the year will have to get by with 10% less than they used at this time last year. This NPA decision is harsher than it seems at first glance. For chemical production has jumped some 25% in the meantime.

Small consolation can be derived from the fact that exports of sulfur have been trimmed slightly. Quota for the United Kingdom, biggest U.S. customer, has been reduced from 250 thousand to 240 thousand tons for this last quarter. A brace of bright spots: higher Mexican sulfur output, and greater use of European sulfur sources.

Apropos the sulfur dilemma, the Office of Price Stabilization decided this week to give sulfuric acid manufacturers a price option. They can file under CPR-22 or play it safe with the General Ceiling Price Regulation until a specific price measure for the acid can be worked out. Prediction: Most will stand pat.

An earlier action by the OPS on sodium silicofluoride hasn't had the expected result. Producers of this chemical, by-product in phosphate processing, are permitted to raise prices about 2¢ a pound, but so far none of them has. Reason: Demand for fluoridation of water has lagged.

More than one company faces a decline in export business. If it isn't allocations, it's prices. One upshot is that companies have less to sell abroad. For another, their foreign buyers find the export red tape and price uncertainty too much to cope with.

But imports of chemical products have been climbing, and will rise some more. Latest figures from the Department of Commerce show that chemical imports in August are more than double those of July. Reason: big boost in alcohol needs for the synthetic rubber program.

MARKET LETTER

WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
Chemical Industries Output Index (1947=100)	122.7	122.5	117.0
Bituminous Coal Production (Daily Average, 1000 Tons)	1,828.0	1,811.0	1,929.0
Steel Ingot Production (Thousand Tons)	2,057.0	2,041.0	1,979.0
Wholesale Prices—Chemicals and Allied Products (1926=100)	141.2	140.9	131.6
Stock Price Index of 14 Chemical Companies (Standard & Poor's Corp.)	247.0	247.8	194.6
Chemical Process Industries Construction Awards (Eng. News-Record)	$34,030,000	$6,729,000	$9,550,000

MONTHLY BUSINESS INDICATORS—EMPLOYMENT (Thousands)	Latest Month	Preceding Month	Year Ago
All Manufacturing	13,076	13,080	13,016
Non-durable Goods	5,770	5,809	6,003
Chemicals and Allied Products	543	532	506
Paper and Allied Products	414	418	418
Rubber Products	214	219	215
Petroleum and Coal Products	197	198	189

Chemical import flow will be quickened by higher European chemical production and Torquay pact concessions. Another possible factor: devaluation of the British pound and the French franc.

England eyes devaluation as a means of halting her slackening chemical export trade with the United States and Canada. A similar move in 1949 brought lower prices; further reductions would affect U.S. chemical sales here and abroad.

Repercussions will also be felt here from Britain's loss of Iranian oil. A worsening shortage impends in the United States because of expropriation.

The Petroleum Administration for Defense has taken two steps to soften the blow. The first: Refiners who carry out authorized expansion of alkylate facilities will be protected from financial loss in the next five years.

PAD's other edict sets minimum standards for the use of tetraethyl lead in upping octane rating. Fortunately, the leading producers, Du Pont and Ethyl Corp., are already well advanced on TEL expansion. If a bottleneck develops, it will be due to lack of lead, not ethyl chloride.

Allocation of thiokol under order M-45 this week stems from the military's need for self-sealing gas tanks. The National Production Authority has paid heed to the Pentagon's behest, and civilian industry must scout for substitutes.

Allocations have brought ethyl cellulose producers to the unusual order-seeking stage. The prospect of military needs for the plastic scared off other customers. But recent easing of defense business makes ethyl cellulose a buyable commodity again.

That should be good news not only to plastics users but to the surface coatings industry as well. Paints and lacquers have been moving faster since August, with demand in the Southwest and Far West especially strong. Pace-setters: latex paints.

SELECTED CHEMICAL MARKET PRICE CHANGES—Week Ending October 22, 1951

	Change	New Price		Change	New Price
UP					
Carnauba Wax, No. 1, yel.	$ .05	$ 1.21	Polystyrene, colors	$ .01	$ .355
Ouricury Wax	.01	.83	Crystals	.02	.325
DOWN					
Methoxychlor, 50% wettable	.04	.62	Quicksilver, 76 lb. flask	1.00	218.00
Methyl Anthranilate	.15	2.35	Tricholine citrate	.45	1.65

All prices per lb. unless quantity is stated.

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EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

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$1.20 a line, minimum 3 lines.
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INFORMATION

BOX NUMBERS count as one additional line in undisplayed ads.

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DISPLAYED RATE:

The advertising rate is $8.50 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request. AN ADVERTISING INCH is measured 7/8 inch vertically on one column, 3 columns—30 inches

—to a page C. W.

NEW ADVERTISEMENTS received by 10 A.M. October 31st at the New York Office, 330 W. 42nd St., New York 18, N. Y., will appear in the November 10th issue subject to limitations of space available

---

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AUCTION

At Auction

MACHINERY AND EQUIPMENT OF MEADVILLE DISTILLERY

Race Street, Meadville, Pa.

N. W. Section of Penna. 30 Mi. S. of Lake Erie

TUESDAY, NOVEMBER 13, AT 10 A. M.

on the premises

Sharples Stainless Steel Super Centrifuge RM-3234-3B, 8 Beaird Challenger Horizontal Rotary type Vegetable Dehydraters approximately 5' x 44', 3 oil fired, 5 gas fired; Sprout Waldron Type 14 Hammer Mill d. e. to 50 HP Crocker Wheeler 3 phase Motor with Westinghouse 40 to 50 HP Automatic Starter (new). Potdevin Labeling Machine. Haskins Bottle Capper. Ertel Bottle Filler. Kiefer 52" Rotary Bottle Washer. 48 bottle capacity; Woodruff & Edwards Meal Grinder. Adt motor driven Grain Press. Falk motor driven vertical Agitator. Copper 5-section Beer Still 9' x 33' (¼" copper plate bolted sections); 15 Copper Tanks various sizes; Cooper Shell Condenser 19' high. Vertical Cooper Doubler Tank. Cypress Tanks. Steel Storage and Hopper Bins. Flour Dresser Sifter and Grinding Mills. Cyclone Dust Collector. Worm Conveyors and Bucket Elevator. Power driven Winch and Hoist. Pennsylvania motor driven Horizontal Air Compressor 7 x 7. 2 Allis Chalmers 150 KW Engine Generator Sets. Ridgeway Engines 150 lb. back pressure. Electric Motors from 1 to 50 HP. Brass and Copper Pipes, Valves and Fittings. Shafting, Belting and Supplies. Simplex Time Clock and Structural Steel Corrugated Iron Building.

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Products and literature in this issue are listed on these pages. There are three indexes. (1) Editorial items on new products, new equipment, new literature; (2) products advertised. (3) The index of advertisers is on the following page.

THE NUMBERS

Advertisements:—There is a page number on the coupon for each advertisement. Before the number, may appear, L, R, T, B (left, right, top, bottom), locating the ad on the page: small letters following (a,b,c) indicate additional products in the advertisement.

Editorial Items:—Numerals are page numbers; the ABC's distinguish among items where more than one is on a page. There is a number on the coupon for each item referring to new products, equipment, and literature.

EDITORIAL ITEMS

For more data, circle number on coupon.

NEW PRODUCTS

Estrogen 28C
Rubber Antioxidant 28B
Textile Preserver 28A

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Laboratory Sterilizers 48H
Motor Starters 48J
Recorders and Controllers 48G
Vacuum Impregnation 48K
Welding Fittings and Joints 48I

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For more data, circle number on coupon

Chemical processes,
chlorine dioxide process 1

Chemicals
Alkyl phosphites 42c
Aluminum nitrate 49a
Barium fluoride 49b
Borax T4a
Boric acid T4b
Butanol 26a
Butyl acetate 26b
Calcium phosphate 49c
Cresylic acid B4
Di-t-butyl peroxide T16
Driers 50c
Formaldehyde 32
Furnace black 50a
Grain protectant, pyrenone 7-8
8 Hydroxy quinoline base B24a
Industrial chemicals 3a
Insecticide concentrates T34
Metallic stearates 50b
Para amino, benzoic acid B24b
Petroleum sulfonates B16c
Petrolatums B16b
Phosphorus oxychloride 42b
Potassium hydroxide 23b
Pyrobor T4c
Pyrrolidine 20
Sodium biphthalate 49d
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Mail to Chemical Week, 330 W. 42nd St., N. Y. 18, N. Y.

NAME _____

POSITION _____

COMPANY _____

ADDRESS _____

CITY & STATE _____

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Expires January 27, 1952

BOOKLETS . . . .

Chemicals

Synthetic Urea

10-p. brochure on synthetic urea covering its properties, development and manufacture by the Pechiney process, a method which has been utilized by a urea plant at St. Auban, France; the advantages and possibilities of urea as a fertilizer, protein and plastic product are reviewed. Foster Wheeler Corp.

Silicone Resin

7-p. data sheet concerned with the advantages and limitations, performance, preparation and application methods of a silicone resin identified as "XR-129"—to be used as a water repellent for masonry. Dow Corning Corp.

Lubricants

8-p. bulletin giving information on Molykote lubricants, main ingredient of which is a molybdenum-disulfide powder; industrial case histories are presented of the lubricants as used for machine tools and dies, in extreme temperatures, in the cold forming of metal and as an aid when steel does not cold-form properly. The Alpha Corp.

Sulfone

Booklet describing the physical and chemical properties and suggested applications of a new sulfone, diamino diphenyl sulfone, which has potentialities as an intermediate in organic synthesis, as a base for ion-exchange resins and for use in the synthesis of azo dyes. Monsanto Chemical Co., Merrimac Div.

Dyes

Brochure outlining current methods of dyeing some of the new synthetic fibers and blends, such as Dacron, Dynel, Orlon, nylon and acetate and nylon blends; indicates fastness properties to be expected as well as limitations to be observed in dyeing these synthetics. General Dyestuff Corp.

Equipment

Laboratory Glassware

190-p. catalog giving technical data on the composition, durability, temperature limits, softening point and properties of the firm's line of chemical glassware; seven sections cover "Pyrex" brand laboratory, fritted and low actinic ware, "Vycor" brand laboratory and pharmaceutical ware in addition to tubing and rod made from chemical glass. Corning Glass Works.

Recorders and Controllers

40-p. catalog containing technical information on pH and conductivity recorders and controllers to be used for such process variables as hydrogen ion concentration, oxidation-reduction potential and electrolytic conductivity; explained are fundamental operating principles, measuring systems, components and typical applications. Minneapolis-Honeywell Regulator Co.

Laboratory Sterilizers

16-p. catalog describing the construction, operation and particular applications of the firm's line of laboratory sterilizers in both double- and single-wall units; included are descriptions of standard autoclaves, animal cage sterilizers, autoclaves for use with either pressure-steam or Carboxide gas and various accessories. American Sterilizer Co.

Welding Fittings and Joints

6-p. folder presenting information on sizes, types, design and application of welding fittings and joints specifically intended for corrosion resistant coated piping. Welstrom Co.

Motor Starters

8-p. folder supplying information on dimensions, weights, ratings and wiring diagrams for small-type magnetic across-the-line starters which are designed for operation in hazardous locations. The Arrow-Hart & Hegeman Electric Co.

Vacuum Impregnation

22-p. brochure devoted to the subject of vacuum impregnation. The booklet explains the process, reviews its industrial applications, advantages, etc. Equipment used in vacuum impregnation is illustrated and described as to design and construction, specifications, and typical installations. F. J. Stokes Machine Co.

WATEROUS PUMPS assure UNIFORM FLOW CONTROL!

No internal contact or friction between rotor and housing. Fixed clearances assure constant flow settings. Ideal for applications requiring controlled capacities. *Available in 316 Stainless Steel.*

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Dallas 1 ..... James Cash, First National Bank Bldg.

Los Angeles 17 ..... Jos. H. Allen, 1111 Wilshire Blvd.

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Detroit 26 ..... 856 Penobscot Bldg

Pittsburgh 22 ..... 738 Oliver Bldg.

St. Louis 8 .... 3615 Olive St., Continental Bldg.

FOR SPORTSMEN ONLY...

What schools do these mascots represent?

1 TIGER

5 LION

2 BEAR

6 WILDCAT

3 MULE

7 PANTHER

4 HORSE

See next column for answers.

Just as these mascots represent a few of the many collegiate football teams on the gridiron this fall, the above fine chemicals are but four of the hundreds produced by B&A for exacting industrial applications.

Over 1,000 reagents and fine chemicals are listed in the new 264-page 1951-52 Baker & Adamson Catalog. It is free to qualified buyers of fine and special chemicals and laboratory reagents. Write today on business letterhead for your copy!

FOR CHEMICAL USERS ONLY

Which of these B&A Fine Chemicals fit your production needs?

★ **ALUMINUM NITRATE, Crystal—$Al(NO_3)_3 \cdot 9H_2O$**

Of consistently high assay, 99.5% minimum, B&A Aluminum Nitrate is available as a colorless 9-water crystal in two grades—Reagent and Purified. Being very low in iron and sulfate, the Reagent grade is particularly adaptable to use as a source of aluminum oxide in the manufacture of radio and television tubes, fluorescent and incandescent lamp bulbs and lamp mantles. The Purified grade offers a quality suitable for such uses as in the manufacture of catalysts.

★ **BARIUM FLUORIDE—BaF_2**

A superior product, low in impurities, B&A Barium Fuoride assays 99% min. in the Reagent grade and 98% min. in the Technical. Its many applications include: ingredient of brazing and soldering fluxes; ceramic frit flux; ingredient of welding rod coatings; flux in preparation of high-copper alloys. It is also used in making heat-treating salts; as a filler in the manufacture of certain plastics, and for insulating electrodes of cathode ray tubes.

★ **CALCIUM PHOSPHATE, Dibasic, Reagent—$CaHPO_4$**

B&A Calcium Phosphate, Dibasic, Reagent is produced as a white, free-flowing powder, low in both heavy metals and alkalies. The carefully controlled ratio of CaO to P_2O_5, and the extreme uniformity of this high quality product make it eminently suitable for use in the manufacture of phosphors. It also finds use in the manufacture of bio-chemicals or antibiotics.

★ **SODIUM BIPHTHALATE—$C_8H_5O_3Na \cdot H_2O$**

A free-flowing white crystal, Baker & Adamson Sodium Biphthalate assays 96% minimum. It is particularly low in iron and heavy metals and the pH is maintained within carefully-controlled limits. This fine chemical merits investigation if your process calls for a pure, soluble salt with a mild acid reaction.

These mascots represent such schools as: (1) Princeton, Louisiana State, Missouri; (2) Brown, U.C.L.A., Baylor; (3) Army, Muhlenberg, Colby; (4) So. Methodist, Western Michigan, Santa Clara; (5) Columbia, Penn State, Loyola (Cal.); (6) Kentucky, Kansas State, Northwestern; (7) Pittsburgh, Iowa Teachers, Middlebury.

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STANDARD OF PURITY
FINE CHEMICALS

BAKER & ADAMSON *Fine Chemicals*

GENERAL CHEMICAL DIVISION

ALLIED CHEMICAL & DYE CORPORATION

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In Canada: The Nichols Chemical Company, Limited • Montreal* • Toronto* • Vancouver*

SETTING THE PACE IN CHEMICAL PURITY SINCE 1882

* Complete stocks are carried here.

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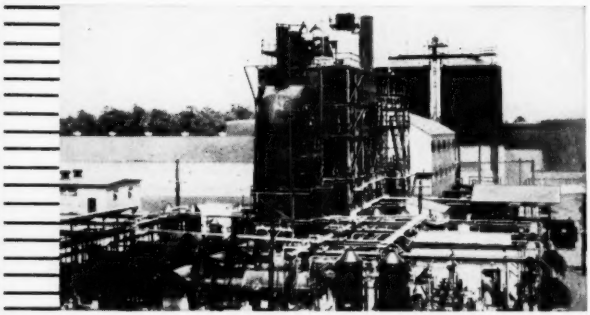
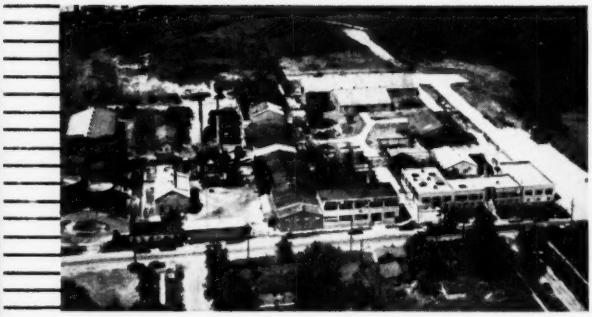


LAKE CHARLES, LA.

IN LAKE CHARLES

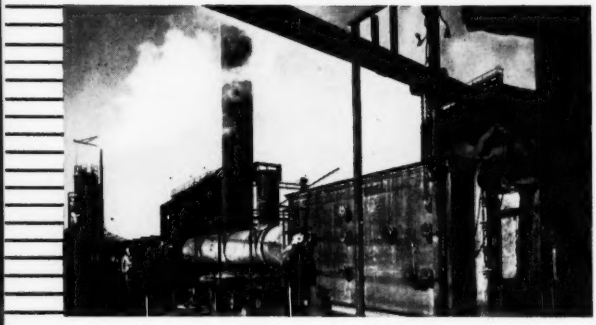
Witco-Continental's new plant is now in full scale production of High Abrasion Furnace black. Capacity: 25 million lbs. a year.



CHICAGO, ILL.

IN CHICAGO

Witco has increased its plant and production facilities to assure an even greater supply of metallic stearates, driers, vinyl stabilizers and other vital chemicals.



SUNRAY, TEXAS

IN SUNRAY

Witco-Continental has expanded its facilities for production of Semi-Reinforcing Furnace black.

And you can be sure that Witco's 8 plants, located in strategic industrial areas across the country, are bending every effort to supply the quality basic chemicals so in need today.

A letter will bring you prompt information on any of Witco's products.

WITCO CHEMICAL COMPANY · 295 MADISON AVE., NEW YORK 17, N. Y.

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